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Composition and Utilization of Range Vegetation of Sutton and Edwards Counties



AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS
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Chemical analyses were made of 349 samples of range vegetation, and a study of the various kinds of vegetation eaten by cattle, sheep and goats was made in Sutton and Edwards Counties. Cattle fed on the smallest numbers of different kinds of plants, sheep came next, while the diet of the goats was quite diversified.

The work indicated that the forage supplied sufficient quantities of lime (calcium) to the cattle, sheep and goats. The protein was probably insufficient in the rations of the cattle in February, March, April, and November of the years studied. The protein was probably insufficient in the rations of the sheep and goats only in one month (November) of the period studied. The phosphoric acid was probably insufficient in the ration of the cattle from September through February, that of the sheep in December 1930, January 1931 and September to December 1931, and that of the goats was probably deficient from October 1930 through February 1931 and October, November, and December 1931.

In order to facilitate comparisons, the percentages of protein, lime and phosphoric acid are expressed in grades for the various forages, with Grade No. 1 containing those with the highest percentage and Grade No. 5 containing those with the lowest.

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Composition and Utilization of Range Vegetation of Sutton
and Edwards Counties

G. S. Fraps, Chief, Division of Chemistry, and V. L. Cory, Acting Chief,
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It is well recognized that during some seasons of the year, range animals do well, while during other seasons, they are not so thrifty. Also ranges differ from one another. The same kinds of plants differ in nutritive value during the various seasons of the year. Investigation is needed to ascertain the extent of these differences and how to correct them.

In order to secure information as to the nutritive values of range vegetation at different seasons of the year in typical localities, an extensive series of samples of range vegetation was collected in Sutton County and Edwards County and subjected to analysis. Some of the samples were collected at different times during the season, while only a few samples of the others were collected. Some of the plants collected are eaten only to a small extent, by the range animals, and others not at all, but analyses seemed to be desirable.

The work was conducted from October 1930 to December 1931, inclusive, on the Ranch Experiment Station, (Texas Substation No. 14) which is located in Sutton and Edwards Counties, in the Edwards Plateau, where the pastures are fenced and in which grazing is continuous. Some of the samples were collected from a wider area. The native vegetation, according to Carter (Bulletin 431) is a thin cover of short grasses, largely buffalo and mesquite grasses, with scattered growth, in many places, of small trees, chiefly live oak and shin oak, with many shrubs. The elevation is 2000 to 4000 feet above sea level. The average annual rainfall is 20 to 25 inches. The soils are derived from limestone. Analyses reported by Fraps and Fudge in Bulletin 549 indicate that the soils have a fair to good content of total, acid-soluble, and active potash, acid-

Rainfall recorded at Substation No. 14, Sonora, Texas

	Rainfall, inches	
	1930	1931
January.....		4.26
February.....		5.78
March.....		3.15
April.....		1.21
May.....		3.22
June.....		1.60
July.....		4.41
August.....		4.36
September.....		2.85
October.....	6.31	3.48
November.....	4.69	5.04
December.....	5.94	9.08
Total.....		48.44

soluble lime and magnesia and basicity and are neutral to slightly alkaline in reaction. The content of total phosphoric and of active phosphoric acid are fair to low, while the nitrogen content ranges from fair to high.

As the climatic conditions affect the growth of the vegetation, the rainfall at Sonora, Sutton County, for the period of the study, is given below. The rainfall for October, November, and December 1930 was high, and for 1931 was considerably higher than the average.

During the period of collection of the samples, representative animals were followed on the range, and the time spent by them in grazing on different kinds of plants was recorded. This record was taken as a rough measure of the quantity of the various forages being eaten.

Cory, in a previous bulletin (367) gives a description of the activities of cattle, sheep, and goats on the range, and a summary of the time spent in travel, in feeding, drinking water, and resting, together with descriptions of the more important plants that were eaten.

The term *forbs* is applied to herbaceous plants, not grasses, which are eaten by cattle, sheep and goats and are sometimes called weeds.

Composition of the Vegetation

The usual feeding analyses of the various kinds of plants collected and dried (numbering 349) are given in Table 1 together with the date of collection. They are arranged in alphabetical order, according to the botanical name. The ordinary name is also given, when available.

Table 2 contains a list of the ordinary names used in this locality, together with the corresponding botanical names. The ordinary name may be different in different localities for the same kind of plant, as shown by the botanical name, and the same ordinary name may be used for different kinds of plants, so that the ordinary name is not always definite.

These analyses show not only the composition of the plants eaten by the cattle, sheep and goats, but also the composition of some of the other vegetation. With the forages eaten more frequently by the animals, several analyses were made at different periods of growth. The younger plants are usually higher in protein, and lower in crude fiber, than the older plants. Some of the old plants are very low in protein. The mineral content of potash (K_2O), lime (CaO), magnesia (MgO), phosphoric acid (P_2O_5), and the grades in protein, lime and phosphoric acid are given in Table 4.

Grades of Protein, Lime, and Phosphoric Acid in the Vegetation

In order to facilitate comparison of the composition of the samples, they are grouped into 5 classes or grades, according to their content of protein, phosphoric acid and lime. A similar system of grading the percentages of constituents has been used with soils (Bul. 449) and the same system with forage grasses of the East Texas Timber Country (Bul. 582). The grades are to a certain extent empirical, but the grouping of the analyses has been made so as to carry as much meaning as possible. The grades selected, with their provisional interpretation, are given in

Table 1. Percentage Composition of Forage Plants of Sutton County, as Dried for Analysis

Stage of growth or character of sample	Date collected	Protein	Ether extract	Crude fiber	Nitrogen free extract	Water	Ash
	1930-31						
<i>Abutilon incanum</i> , Indian mallow							
fruiting.....	6/13/31	17.55	1.32	22.44	41.58	7.39	9.72
preflowering.....	8/24/31	18.70	1.95	19.31	44.43	6.93	8.68
<i>Acacia angustissima</i> , prairie guajillo							
foliage.....	5/ 1/31	27.37	2.43	14.68	44.33	7.02	4.17
tops of flowering.....	7/15/31	22.03	4.61	16.83	44.94	6.71	4.88
<i>Acacia Roemeriana</i> , catsclaw							
foliage.....	6/ 1/31	19.58	2.34	18.71	48.27	6.93	4.17
foliage.....	7/14/31	18.60	4.31	18.98	46.30	6.37	5.62
<i>Acalypna gracilens</i> , slender three-seeded mercury							
fruiting.....	8/28/31	14.77	3.25	16.43	49.94	7.89	7.72
<i>Acleisanthes longiflora</i> , angel trumpets							
preflowering.....	7/14/31	22.75	1.94	23.07	35.42	6.36	10.46
<i>Actinea odorata</i> , poison bitterweed							
stems and leaves preflowering.....	1/23/31	31.21	3.05	8.12	38.92	8.07	10.63
stems and leaves preflowering.....	2/24/31	29.68	3.01	11.89	33.64	9.82	11.96
stems and leaves flowering.....	4/ 1/31	11.04	3.26	19.29	52.39	8.24	5.78
<i>Actinea scaposa linearis</i>							
fruiting.....	6/ 2/31	11.52	6.70	23.45	41.95	7.90	8.48
<i>Agave lecheguilla</i> , lechuguilla							
foliage minus points and bases.....	2/27/31	6.50	2.23	25.96	52.15	4.91	8.25
<i>Allium Drummondii</i> , white onion							
green parts.....	4/30/31	11.46	1.75	20.69	50.21	8.64	7.25
<i>Alternanthera repens</i>							
fruiting.....	8/24/31	19.64	1.50	13.79	38.18	7.00	19.89
<i>Amaranthus Berlandieri</i>							
fruiting.....	8/24/31	24.46	1.59	10.47	37.61	6.45	19.42
<i>Amaranthus blitoides</i>							
green parts.....	6/ 1/31	25.29	1.33	10.99	36.30	6.20	19.89
fruiting.....	8/24/31	17.25	1.18	12.21	38.17	6.58	24.61
<i>Amaranthus Palmeri</i>							
flowering spikes.....	8/24/31	15.82	1.94	20.00	44.20	7.20	10.84
<i>Amaranthus retroflexus</i>							
green parts.....	6/ 1/31	23.91	1.38	9.98	40.09	7.11	17.53
<i>Ambrosia psilostachya</i> , ragweed							
green parts.....	6/ 3/31	21.82	4.95	10.98	39.25	8.65	14.35
<i>Andropogon cirratus</i>							
plants in head.....	9/28/31	3.35	1.67	33.62	49.06	7.95	4.35
<i>Andropogon saccharoides</i> , silver beardgrass							
stems and foliage.....	6/14/31	7.50	1.60	32.00	42.24	7.22	9.44
green growth; preheading.....	7/13/31	10.35	2.08	30.14	42.79	6.62	8.02
past maturity, stems out.....	11/11/31	3.73	1.72	31.36	47.92	6.64	8.63

Table 1. Percentage Composition of Forage Plants of Sutton County, as Dried for Analysis—Continued.

Stage of growth or character of sample	Date collected	Protein	Ether extract	Crude fiber	Nitrogen free extract	Water	Ash
	1930-31						
<i>Aphanostephus humilis</i>							
green parts.....	4/30/31	12.33	2.28	17.17	52.08	7.96	8.18
flowering.....	5/23/31	7.96	2.57	26.57	48.62	7.81	6.47
flowering and fruiting.....	7/14/31	14.15	3.38	24.47	43.25	7.09	7.66
<i>Aristida purpurea</i> , purple three-awn grass							
past maturity.....	9/26/31	5.47	1.57	31.21	45.92	7.86	7.97
past maturity; some green basal growth.....	10/19/31	5.60	1.49	29.64	44.60	7.93	10.74
past maturity; some green basal growth.....	11/13/31	6.07	1.28	32.56	43.81	6.88	9.42
mixed cured and green.....	12/14/31	6.08	1.47	35.01	45.67	6.38	5.39
<i>Aristida Wrightii</i> , Wright three-awn grass							
mostly mature.....	11/20/30	6.45	1.56	30.88	44.09	6.58	10.44
mostly mature.....	12/19/30	8.90	1.58	25.84	42.98	7.51	13.19
cured growth.....	2/3/31	6.62	1.42	28.22	45.40	7.33	11.01
mixed green and cured.....	2/25/31	8.70	1.69	25.23	43.36	8.85	12.17
green foliage and stems.....	6/4/31	7.21	1.26	35.06	41.23	7.23	8.01
foliage, mostly green.....	8/24/31	7.36	1.89	31.74	43.36	6.11	9.54
matured.....	9/26/31	5.56	1.48	33.60	42.49	7.59	9.28
<i>Artemisia vulgaris</i> gnaphalodes, woolly wormwood							
tops of preflowering plants.....	7/13/31	10.56	5.55	31.20	39.76	7.01	5.92
<i>Aster ericoides</i>							
budding and flowering.....	9/28/31	6.92	4.53	19.17	54.55	9.01	5.82
<i>Astragalus Nuttallianus</i> , Nuttall milkvetch							
young green.....	3/24/31	20.80	2.72	13.48	46.27	7.98	8.75
<i>Astragalus macilentus</i> , thin milkvetch							
young green.....	3/23/31	21.67	2.23	15.73	45.02	8.09	7.26
<i>Avena sativa</i> , oats							
luxuriant green growth.....	12/18/30	25.63	5.00	16.59	30.15	8.96	13.67
<i>Berberis trifoliata</i> , agrito							
mature foliage.....	11/19/31	10.32	2.38	30.59	47.61	6.13	2.97
<i>Bouteloua curtipendula</i> , side-oats grama							
mostly mature.....	12/19/30	6.41	2.04	25.71	46.29	7.60	12.22
mostly plants in head.....	7/13/31	7.56	1.66	33.70	43.59	6.50	6.99
<i>Bouteloua hirsuta</i> , hairy grama							
fruiting.....	8/31/31	7.71	1.66	31.89	44.61	6.49	7.64
<i>Bouteloua trifida</i> , red grama							
past maturity.....	9/26/31	6.99	2.08	30.34	44.49	8.15	7.95
<i>Boerhaavia tenuifolia</i>							
flowering.....	8/28/31	10.61	2.00	22.57	48.80	7.20	8.82
<i>Bromus catharticus</i> , rescue grass							
foliage, preheading.....	3/23/31	11.08	2.43	24.99	46.30	7.20	8.00
plants in head.....	5/1/31	11.65	1.19	24.60	49.53	7.76	5.27
foliage, preheading.....	2/24/31	21.99	3.22	20.16	36.42	8.81	9.40
<i>Buchloe dactyloides</i> , buffalo grass							
luxuriant green growth; second clipping.....	5/28/30	11.55	1.79	23.85	48.31	7.02	7.48

luxuriant maturing growth	10/20/30	7.71	1.61	23.67	45.56	7.41	14.04
mostly mature	11/19/30	7.41	1.69	23.06	45.66	7.31	13.87
mostly mature	12/19/30	6.58	1.35	25.18	46.89	7.96	12.04
mostly green	4/30/31	12.01	2.30	25.00	46.21	7.27	7.21
luxuriant green	6/ 1/31	11.85	1.57	26.64	42.47	7.49	9.98
green growth after mowing	7/ 9/31	11.92	1.86	25.81	42.66	7.55	10.20
partly cured foliage	8/31/31	8.75	1.74	22.74	45.26	6.48	15.03
<i>Bumelia texana</i>							
mature foliage	11/18/30	12.29	9.69	23.90	42.23	5.65	6.24
<i>Callirrhoe pedata</i> , annual poppy mallow							
green parts	6/ 2/31	9.55	2.46	27.94	43.98	7.50	8.57
<i>Carex planostachys</i> , thicket sedge							
green	11/20/30	12.16	1.56	23.61	46.80	6.69	9.18
green	2/25/31	10.75	1.78	24.53	43.83	9.71	9.40
mostly green foliage	11/12/31	5.80	1.56	26.08	51.02	6.96	8.58
green foliage	12/14/31	7.52	2.00	26.48	47.22	6.92	9.86
<i>Cassia Roemeriana</i> , Roemer senna							
leaves of mature plants	7/ 9/31	16.74	2.33	10.50	51.87	7.92	10.64
tops with flowers and fruits	8/28/31	17.88	2.12	15.66	47.91	7.33	9.10
<i>Celtis reticulata</i> , hackberry							
foliage	6/ 3/31	14.35	1.55	16.88	44.01	8.81	14.40
<i>Centaurium calycosum</i> , centaury							
flowering plants	6/ 2/31	8.55	3.40	17.21	60.87	6.64	3.33
<i>Chamaejasme sordida</i>							
flowering and fruiting plants	9/ 5/31	21.66	2.72	14.54	39.56	7.49	14.03
<i>Chenopodium albescent</i>							
green parts	5/ 1/31	25.13	1.63	10.46	30.38	6.57	25.83
<i>Chloris virgata</i> , feather fingergrass							
fruiting plants	8/31/31	10.01	1.91	31.10	42.70	6.37	7.91
<i>Chloris</i> sp.							
cultivated-preheading plants	8/24/31	13.83	2.35	28.29	39.55	6.42	9.56
<i>Cirsium austrinum</i> , Southern pasture thistle							
green parts	5/ 1/31	22.79	2.51	13.18	39.62	8.31	13.59
<i>Clematis Drummondii</i> , Texas virgin flower							
flowering plants	8/31/31	14.71	1.89	25.71	45.92	6.76	5.01
<i>Colubrina texensis</i>							
foliage from young growth	11/19/31	19.80	2.87	12.10	49.82	8.32	7.09
foliage from new growth	11/12/31	16.03	5.44	9.53	52.55	7.56	8.89
<i>Condalia obtusifolia</i> , lote bush							
foliage	6/ 4/31	21.30	1.88	8.38	54.75	7.67	6.02
foliage	7/15/31	20.41	2.47	10.33	51.94	6.63	8.22
<i>Corydalis aurea occidentalis</i> , fanutry							
stems and leaves	12/18/31	35.75	3.06	8.60	31.31	7.91	13.37
<i>Croton corymbulosus</i>							
green parts	6/ 5/31	17.02	2.81	16.90	50.15	7.29	5.83
<i>Croton monanthogynus</i> , annual croton							
green parts	6/ 2/31	20.52	3.14	16.37	44.17	7.10	8.70
fruiting plants	8/31/31	15.45	3.88	23.80	42.84	6.55	7.48
tops of fruiting plants	9/28/31	9.64	5.69	23.93	47.65	7.21	5.88
fruiting tops	10/20/31	11.49	4.87	24.90	44.43	7.28	7.03

Table 1. Percentage Composition of Forage Plants of Sutton County, as Dried for Analysis—Continued.

Stage of growth or character of sample	Date collected	Protein	Ether extract	Crude fiber	Nitrogen free extract	Water	Ash
<i>Croton neomexicanus</i> , New Mexico croton	1930-31						
fruiting plants.....	10/ 3/31	15.14	3.88	22.00	45.29	7.47	6.22
<i>Cucurbita foetidissima</i> , prairie gourd							
foliage of fruiting plants.....	7/15/31	23.44	3.73	9.43	35.93	7.58	19.89
<i>Cuscuta exaltata</i> , livecack dodder							
succulent stems.....	7/13/31	7.12	1.56	22.85	59.38	6.37	2.72
<i>Cynodon dactylon</i> , Bermuda grass							
luxuriant maturing growth.....	10/21/30	12.37	1.99	21.78	45.71	7.25	10.90
mature growth.....	11/20/30	9.84	1.55	23.21	47.59	7.19	10.62
mature growth.....	12/19/30	8.37	1.35	31.64	51.90	7.76	8.98
luxuriant green growth.....	6/ 3/31	17.85	1.64	24.07	37.77	6.93	11.74
plants heading.....	7/ 9/31	11.10	1.77	23.43	47.11	7.04	9.55
partly cured foliage.....	8/31/31	8.34	1.48	21.64	53.32	6.47	8.75
luxuriant green growth.....	10/20/31	14.91	2.49	21.52	45.03	7.12	8.88
luxuriant green growth.....	11/11/31	12.45	2.30	24.94	44.96	7.04	8.31
luxuriant partly cured growth.....	12/12/31	10.16	1.50	25.59	46.94	7.29	8.52
<i>Dasylicon texanum</i> , setol							
distal portions of foliage.....	2/27/31	6.61	1.97	36.20	45.12	7.29	2.81
<i>Daucus pusillus</i> , wild carrot							
green parts.....	5/ 1/31	10.85	2.86	14.39	55.39	8.09	8.49
fruiting umbels.....	6/17/31	10.44	8.58	19.95	42.81	9.68	8.54
<i>Descurainia pennata</i> , tansy mustard							
green parts of flowering plants.....	2/25/31	34.20	1.99	14.67	28.20	8.59	12.35
<i>Desmanthus fallax</i>							
flowering.....	6/ 2/31	17.09	2.34	18.91	48.78	7.77	5.11
<i>Digitaria sanguinalis</i> , crab grass							
plants heading.....	7/ 9/31	12.33	2.82	26.40	38.23	6.93	13.29
<i>Digitaria</i> sp.							
cultivated, fruiting plants.....	8/24/31	12.56	3.13	30.33	38.11	6.51	9.36
<i>Diospyros texana</i> , Mexican persimmon							
mature foliage.....	10/16/30	11.52	9.64	18.98	45.19	6.01	8.66
younger foliage.....	6/ 1/31	15.21	3.99	20.39	46.03	6.93	7.45
foliage; mostly diseased.....	10/20/31	9.87	7.13	19.38	43.80	6.65	13.17
<i>Draba cuneifolia</i> , Whitlow wart							
green parts of flowering plants.....	2/21/31	14.40	1.92	16.06	43.28	8.55	13.79
<i>Echinochloa colonum</i> , jungle rice							
fruiting plants.....	8/24/31	16.30	2.24	27.77	34.66	6.23	12.80
<i>Elymus brachystachys</i> , wild rye							
plants in head.....	6/ 2/31	11.93	1.48	32.93	37.95	6.77	8.94
<i>Engelmannia pinnatifida</i>							
foliage, rosette stage.....	2/25/31	21.59	1.10	9.24	44.94	6.94	16.19
foliage and stems.....	4/29/31	13.87	1.81	23.95	41.90	8.52	9.95

<i>Ephedra antisiphilitica</i> , jointfir green stems of budding plants.....	3/ 1/31	6.55	1.43	31.86	48.66	5.50	6.00
<i>Eragrostis cilianensis</i> , stinkgrass maturing plants.....	8/24/31	11.37	1.46	25.88	44.38	6.73	10.18
<i>Erigeron canadensis</i> , Canada fleabone tops of flowering plants.....	8/ 6/31	14.90	1.81	26.12	46.43	2.54	8.20
<i>Eriochloa gracilis</i> fruiting plants.....	9/ 5/31	12.07	2.19	26.90	40.11	8.93	9.80
<i>Erodium cicutarium</i> , filaree green parts—flowering stage.....	2/27/31	24.44	1.80	11.95	37.38	9.88	14.55
<i>Erodium texanum</i> , large-flowered stork's bill foliage from Sonora.....	2/24/31	23.19	2.26	7.73	47.26	7.97	11.59
foliage from Sanderson.....	2/27/31	21.38	2.08	7.10	51.15	9.45	8.84
<i>Euphorbia corollata</i> young plants.....	3/30/31	11.81	3.30	10.33	60.84	7.64	6.08
<i>Euphorbia corollata</i> fruiting plants.....	8/24/31	14.76	4.28	13.82	45.58	7.26	14.30
<i>Evax multicaulis</i> , evax young plants.....	3/30/31	13.03	2.00	18.73	38.91	6.78	20.55
mature plants.....	5/15/31	10.47	2.20	30.22	38.54	6.76	11.81
<i>Evax prolifera</i> , evax mature plants.....	6/ 2/31	7.01	2.52	33.13	27.42	6.62	23.30
<i>Festuca octoflora</i> , annual fescue grass young plants—preheading.....	3/23/31	18.29	3.01	21.86	41.32	7.04	8.48
green plants in head.....	4/26/31	9.36	2.05	27.34	47.33	7.21	6.71
Forbs, mixed stems and foliage.....	10/18/30	20.32	3.64	13.21	41.09	7.36	14.38
stems and foliage.....	12/18/30	34.71	2.15	9.17	32.85	8.43	12.66
young plants.....	2/ 3/31	22.42		8.90			20.82
<i>Forestiera neomexicana</i> young foliage.....	3/30/31	18.39	2.69	8.83	57.65	6.41	6.03
foliage.....	6/ 4/31	11.78	1.77	15.04	56.81	7.31	7.26
foliage.....	7/15/31	8.81	1.85	11.99	64.22	6.04	7.09
<i>Gaillardia pulchella</i> , Indian blanket fruiting plants.....	6/ 4/31	11.97	4.26	26.37	39.44	7.58	10.38
<i>Gaura coccinea</i> fruiting plants.....	6/17/31	10.95	2.20	23.80	48.39	7.77	6.89
budding plants.....	8/31/31	13.35	3.86	16.94	52.07	7.23	6.55
<i>Gaura parviflora</i> fruiting plants.....	5/ 1/31	23.39	1.78	14.47	40.76	7.85	11.75
<i>Geranium carolinianum</i> , geranium green parts.....	4/30/31	12.24	1.84	15.33	50.57	7.98	12.04
Grasses, mixed (<i>Carex</i> , <i>Stipa</i> , <i>Elymus</i> , etc.) green.....	1/24/31	12.03	2.09	23.83	44.25	7.35	10.45
green growth.....	12/18/31	12.54	2.16	22.44	42.13	8.04	12.69
<i>Gutierrezia microcephala</i> , (perennial) snakeweed flowering plants.....	10/ 3/31	9.55	14.65	20.85	43.45	7.55	3.94
<i>Gutierrezia texana</i> , (annual) snakeweed green parts.....	6/ 1/31	13.72	6.68	17.74	49.30	6.91	5.65
<i>Hedeoma Drummondii</i> fruiting plants.....	6/ 2/31	9.93	3.50	27.48	43.09	8.65	7.35

Table 1. Percentage Composition of Forage Plants of Sutton County, as Dried for Analysis—Continued.

Stage of growth or character of sample	Date collected	Protein	Ether extract	Crude fiber	Nitrogen free extract	Water	Ash
<i>Helenium microcephalum</i> , small-headed sneezeweed	1930-31						
preflowering plants	4/22/31	17.11	4.38	10.02	48.59	8.67	11.23
<i>Helianthus annuus</i> , sunflower							
foliage of flowering plants	7/14/31	18.91	6.41	9.86	41.31	7.91	15.60
<i>Helianthus ciliaris</i> , blueweed							
tops of flowering plants	7/15/31	14.63	4.99	14.85	45.00	8.14	12.39
<i>Hilaria Belangeri</i> , curly mesquite grass							
fresh green growth	10/20/30	16.04	2.29	23.75	35.19	7.12	14.61
mostly mature growth	10/21/30	9.44	2.28	24.73	41.07	8.14	14.34
with flowering stalks	11/19/30	9.79	2.41	24.40	42.43	6.74	14.23
mostly mature growth	12/19/30	6.11	2.06	23.46	44.07	6.63	17.67
cured growth	1/23/31	6.01	2.02	25.98	44.09	7.92	13.98
cured growth	2/25/31	5.32	2.16	25.80	43.36	7.92	15.44
large green growth	6/ 2/31	9.04	2.55	27.80	43.81	6.89	9.91
plants in head	7/ 9/31	10.13	2.19	26.95	40.52	7.13	13.08
green plants	8/31/31	10.13	2.19	28.15	38.51	5.99	15.03
partly cured foliage	9/22/31	7.15	2.38	26.78	44.26	8.16	11.27
cured foliage	10/19/31	6.24	2.42	24.74	46.32	8.03	12.25
cured foliage	11/13/31	5.15	1.91	26.51	44.23	7.08	15.12
cured foliage	12/14/31	7.05	2.56	28.13	44.87	6.65	10.74
<i>Hordeum pusillum</i> , little barley							
green plants in head	4/30/31	9.58	1.64	27.59	47.37	6.25	7.57
<i>Hoffmanseggia brachycarpa</i>							
fruiting plants	8/28/31	13.60	2.32	15.77	53.41	7.59	7.31
<i>Houstonia angustifolia</i>							
fruiting tops	10/20/31	7.35	7.04	24.05	50.06	7.99	3.51
<i>Juniperus Pinchoti</i> , Pinchot juniper							
fruits—mature	12/18/30	5.94	11.12	29.35	35.98	14.77	2.81
foliage	3/24/31	7.93	9.48	18.45	52.05	7.66	4.43
<i>Kallstroemia intermedia</i> , caltrop							
fruiting plants	6/17/31	16.95	1.91	18.29	42.88	7.18	12.79
<i>Krameria secundiflora</i>							
fruiting plants	6/ 4/31	13.31	1.52	16.77	55.97	7.35	5.08
<i>Lepidium lasiocarpum</i> Wrightii, Wright peppergrass							
young stems and leaves	1/24/31	34.83	1.56	9.60	31.72	8.12	14.17
preflowering mostly	2/24/31	37.40	1.87	12.51	31.26	6.19	10.77
flowering mostly	3/23/31	24.72	1.58	17.12	40.46	7.73	8.39
flowering and fruiting mostly	4/29/31	20.38	2.13	24.08	38.10	7.78	7.53
<i>Leptochloa dubia</i> , sprangletop							
plants in head	8/31/31	10.91	1.97	30.37	41.68	6.25	8.82
<i>Leptocoma cognatum</i> , fall witchgrass							
plants in head	6/ 2/31	11.36	1.85	33.95	36.23	6.96	9.15
matured plants	9/22/31	6.49	2.38	34.53	42.75	8.00	5.85

Lesquerella Gordonii, Gordon bladderpod							
green parts—budding stage	2/24/31	24.60	1.48	14.03	37.59	8.75	13.55
green flowering and fruiting stage	3/24/31	19.59	2.04	15.90	44.28	8.53	9.66
Leucena retusa							
foliage of flowering trees	7/14/31	16.24	3.60	22.37	43.85	8.08	5.86
Leucephyllum minus							
flowering plants	8/18/31	6.64	5.36	24.23	54.12	6.23	3.52
Liatris purciata, dotted button snakeroot							
flowering plants	10/ 3/30	6.94	8.13	27.08	40.88	7.82	9.15
Limnodea arkarsana							
mature green growth	4/30/31	10.60	2.18	27.03	46.67	7.41	6.11
Lonicera albicoma, white-flowered honeysuckle							
foliage	6/ 4/31	9.85	2.29	8.40	61.94	8.66	8.85
Lupinus texensis, blue clover							
foliage	5/ 1/31	13.57	1.78	18.69	49.12	8.03	8.81
flowers	5/ 1/31	16.07	2.31	22.61	44.78	8.15	8.08
Martynia louisianica, unicorn plant							
foliage of fruiting plants	7/11/31	17.04	8.86	5.78	37.99	6.26	24.07
Melampyrum leucantum							
flowering plants	8/28/31	12.49	9.32	14.79	47.13	7.17	9.15
Mimosa fragrans, fragrant catclaw							
foliage	8/29/31	19.20	3.25	19.74	44.47	6.69	6.65
Meris micophylla, mulberry							
foliage	7/15/31	14.65	5.16	11.08	46.43	7.95	14.73
Nama aspidum							
fruiting plants	6/ 3/31	10.50	2.09	21.24	46.89	9.01	10.27
Nama jamaicense							
fruiting plants	5/ 1/31	15.36	2.20	14.02	37.80	7.21	23.41
Nolina texana (Sacahuiste)							
including succulent bases	11/20/30	6.81	3.00	36.40	39.21	7.61	6.97
tips of foliage	12/18/30	7.05	3.76	37.95	44.10	4.72	2.42
new growth of foliage after burning	12/18/30	7.90	1.70	42.53	39.01	6.56	2.30
whole lengths of foliage	12/18/30	5.06	3.52	38.33	42.27	5.38	5.44
distal ends of foliage	1/28/31	5.57	3.06	40.31	42.96	5.95	2.13
whole lengths of foliage	1/28/31	5.67	3.08	39.70	43.23	3.26	5.06
foliage	2/25/31	5.18	2.91	35.93	42.54	7.71	5.73
foliage	10/21/31	5.27	3.08	43.26	39.62	6.17	2.60
foliage with dead tips removed	11/13/31	5.54	2.49	44.71	38.55	5.72	2.99
foliage with dead tips removed	12/12/31	5.33	2.19	42.05	42.73	5.11	2.59
budding shoots	2/25/31	23.66	2.53	14.95	44.45	8.89	5.52
budding shoots	3/23/31	20.46	2.79	17.56	45.11	8.13	5.95
Oenothera serrulata Drummondii flava, Evening primrose							
green parts	5/ 1/31	8.40	2.79	14.41	61.92	7.74	4.74
Oenothera Greggii lamsana, evening primrose							
flowering plants	5/ 1/31	10.85	2.07	17.57	54.12	8.79	6.60
Oenothera speciosa, showy evening primrose							
green parts	5/ 1/31	19.09	2.07	19.98	42.39	7.85	8.62
green growth after mowing	7/15/31	14.54	3.91	21.41	42.43	8.47	9.24
Opuntia Ellisiana, spineless cactus							
joints as fed to livestock	12/18/30	2.08	.69	17.14	40.46	17.42	22.21
joints, growth of previous year (green)	1/24/31	.63	.27	2.21	12.02	80.27	4.60

Table 1. Percentage Composition of Forage Plants of Sutton County, as Dried for Analysis—Continued.

Stage of growth or character of sample	Date collected	Protein	Ether extract	Crude fiber	Nitrogen free extract	Water	Ash
	1930-31						
<i>Opuntia leptocaulis</i> , tasajillo							
fruits and branchlets.....	12/18/30	8.15	2.70	12.37	51.47	3.34	21.97
fruits and branchlets (green).....	1/24/31	3.69	.89	3.08	18.11	67.49	6.74
<i>Opuntia atropisina</i> , prickly pear							
joints, areolae with spines removed.....	12/18/30	7.00	1.17	10.95	55.39	5.06	20.43
joints with areolae removed.....	1/23/31	8.56	1.44	8.17	57.90	6.06	17.87
mature fruits.....	9/ 8/31	4.58	5.48	32.37	48.69	2.80	6.08
buds and young fruit.....	6/ 2/31	11.69	2.07	12.98	53.13	6.48	13.65
<i>Panicum fasciculatum reticulatum</i>							
fruiting plants.....	6/23/31	17.66	2.05	26.19	34.17	7.17	12.76
fruiting plants.....	8/24/31	16.37	2.46	25.32	36.93	6.32	12.60
<i>Panicum Hallii</i> , Hall panic grass							
fruiting plants.....	8/31/31	10.26	1.89	27.45	44.90	6.39	9.11
<i>Panicum hirticaule</i>							
maturing plants.....	7/15/31	11.14	1.71	38.01	42.00	6.89	10.25
<i>Panicum obtusum</i> , vine mesquite grass							
green growth.....	2/ 3/31	14.89	2.33	20.61	41.02	7.12	14.03
green growth.....	6/ 2/31	16.35	2.77	30.81	33.66	6.27	10.14
fruiting plants.....	8/24/31	14.09	2.53	29.59	37.61	6.41	9.77
<i>Parcelsa frutescens</i>							
foliage of flowering shrubs.....	7/14/31	17.60	6.02	13.42	49.33	7.40	6.20
<i>Parthenium hysterophorus</i>							
preflowering green growth.....	6/13/31	24.84	4.31	11.82	38.03	8.36	12.64
fruiting tops.....	9/ 5/31	17.53	6.27	21.22	37.94	9.30	7.71
<i>Parthenium incanum</i> , mariola							
budding plants.....	8/18/31	15.76	8.19	20.22	39.65	7.43	8.75
<i>Paspalum distichum</i>							
fruiting plants.....	9/ 8/31	9.77	2.55	29.02	40.96	8.78	8.92
<i>Petalostemum multiflorum</i>							
green parts, budding stage.....	6/17/31	12.96	2.67	23.11	47.92	8.01	5.33
<i>Pennisetum clandestinum</i>							
cultivated, green growth.....	8/24/31	16.55	2.17	23.50	40.46	6.95	10.37
<i>Phacelia perei</i>							
foliage-rosette stage.....	2/27/31	24.94	1.54	7.30	43.44	7.76	15.02
<i>Phalaris angusta</i>							
green growth.....	5/ 1/31	18.65	2.82	23.68	38.94	7.33	8.58
<i>Phlox Resmeriana</i>							
flowering plants.....	5/ 1/31	11.50	2.25	23.16	46.01	7.67	9.41
<i>Physalis lobata</i> , violet-flowered groundcherry							
flowering and fruiting plants.....	7/14/31	29.17	3.82	13.46	29.93	7.17	16.45
<i>Pinaropappus roseus</i>							
flowering plants.....	6/ 2/31	11.33	6.14	22.77	47.01	7.33	5.42

Plantago Helleri, Heller plantain fruiting plants.....	4/30/31	10.21	1.99	22.14	53.06	7.69	4.91
Plantago rhodosperma, redseeded plantain green parts.....	2/24/31	17.53	.98	8.25	53.56	11.70	7.98
green parts.....	3/30/31	12.95	1.89	7.63	54.84	8.31	14.38
fruiting plants.....	5/ 1/31	8.75	1.19	19.90	49.20	8.23	12.73
Plantago spinulosa, bracted plantain flowering plants.....	3/23/31	10.96	2.72	14.95	58.67	7.98	4.72
Portulaca reclusa, purslane flowering.....	8/29/31	9.31	4.71	16.80	39.20	6.34	23.64
Prosopis chilensis (Mesquite tree foliage) mature foliage.....	10/17/30	17.62	3.91	25.49	38.71	6.64	7.63
young foliage.....	6/ 1/31	21.67	2.71	22.83	40.82	7.65	4.32
foliage.....	7/14/31	20.42	2.81	26.94	38.79	6.20	4.84
foliage.....	8/29/31	19.26	3.22	26.61	39.67	5.92	5.32
Prosopis chilensis (pods) mature pods.....	10/20/31	15.02	1.54	23.93	48.94	7.24	3.33
pods.....	9/25/31	12.15	2.01	30.92	48.78	2.64	3.50
Prunus minutiflora, small flowered plum foliage mostly from young growth.....	10/17/30	24.72	4.15	9.91	48.29	6.46	6.47
foliage mostly from young growth.....	11/18/30	22.71	4.13	9.44	48.86	7.36	7.00
foliage.....	6/ 1/31	17.84	3.35	10.83	54.84	7.15	5.99
Pyrhopappus carolinianus, false dandelion flowering plants.....	6/ 4/31	11.27	5.47	25.17	41.62	7.84	8.63
Quercus breviloba (shin oak) mostly mature foliage.....	10/18/30	9.05	2.64	20.67	54.16	8.46	5.02
mostly mature foliage.....	11/19/30	7.98	2.80	22.64	54.18	7.15	5.25
foliage.....	6/ 3/31	11.41	1.60	23.95	51.82	7.80	3.42
foliage.....	7/13/31	8.92	2.08	26.53	51.35	6.86	4.26
foliage.....	8/29/31	9.44	1.84	19.33	54.87	7.65	6.87
foliage of sucker plants.....	9/28/31	9.30	2.13	24.07	53.64	7.30	3.56
foliage from sucker plants.....	10/20/31	8.90	2.25	23.26	53.05	7.45	5.09
foliage from trees.....	11/11/31	8.25	2.98	23.96	53.15	6.90	4.76
foliage from trees.....	12/14/31	7.16	2.81	26.07	50.96	6.70	6.30
Quercus virginiana (foliage) (live oak) mostly mature foliage.....	10/18/30	8.88	2.37	27.02	47.43	7.94	6.36
foliage mostly from young growth.....	11/19/30	8.92	2.30	26.59	50.18	7.13	4.88
foliage mostly from young growth.....	12/18/30	8.95	3.17	24.51	51.89	7.04	4.44
foliage.....	1/24/31	9.61	2.63	26.55	47.96	7.52	5.73
mature foliage.....	2/24/31	9.40	2.99	26.47	48.76	7.42	4.96
old foliage.....	3/30/31	8.39	2.51	28.00	47.63	6.28	7.19
new foliage.....	4/28/31	17.69	1.10	22.31	46.40	7.90	4.60
foliage.....	6/ 3/31	11.61	1.36	29.05	44.73	9.38	3.87
foliage.....	7/13/31	9.13	1.91	30.82	47.32	6.96	3.86
foliage.....	8/29/31	9.49	1.70	25.67	51.81	6.88	4.45
foliage.....	9/26/31	8.93	1.71	24.95	50.16	7.75	6.50
foliage.....	10/19/31	9.12	1.89	26.81	49.19	7.60	5.39
foliage from trees.....	11/11/31	8.30	2.49	26.27	51.28	6.13	5.53
foliage.....	12/12/31	10.21	2.60	26.87	48.22	6.77	5.33

Table 1. Percentage Composition of Forage Plants of Sutton County, as Dried for Analysis—Continued

Stage of growth or character of sample	Date collected	Protein	Ether extract	Crude fiber	Nitrogen free extract	Water	Ash
	1930-31						
<i>Quercus virginiana</i> (acorns)							
acorns picked up from ground	10/16/31	4.42	1.83	10.09	47.67	33.24	2.75
acorns fallen from tree	11/19/31	5.58	3.65	10.59	64.76	11.94	3.48
fallen acorns	9/26/31	5.60	1.54	18.33	62.94	9.71	1.88
mature acorns picked from trees	10/19/31	4.65	6.52	9.67	66.96	10.61	1.59
mature acorns picked from trees	11/11/31	3.44	6.37	10.21	73.04	5.68	1.26
acorns picked from trees	12/14/31	5.65	6.39	12.73	68.02	5.48	1.73
<i>Ratibida columnifera</i> , prairie coneflower							
foliage—winter rosette stage	2/24/31	17.96	2.02	11.55	42.01	8.98	17.48
green parts	4/30/31	15.74	4.19	16.18	43.90	8.10	11.89
green parts	6/1/31	20.65	5.24	10.82	40.58	7.75	14.96
mature heads	11/12/31	12.47	5.55	34.28	33.26	7.85	6.59
<i>Rhus microphylla</i> , small-leaf sumac							
foliage from young growth	11/19/30	13.30	6.20	11.50	53.99	6.53	8.48
foliage	6/1/31	15.59	2.09	10.11	61.52	6.22	4.47
foliage	7/13/31	15.17	2.84	10.78	59.72	6.53	4.96
foliage	8/29/31	13.68	4.02	10.83	57.30	5.98	8.19
foliage	10/21/31	14.40	5.40	9.93	54.69	6.78	8.76
foliage and buds	11/12/31	11.54	6.02	10.92	57.46	6.21	7.85
<i>Rhus trilobata</i> , ill-scented sumac							
foliage mostly from young growth	10/18/30	7.33	6.06	9.14	63.16	8.01	6.30
foliage from old and from young growth	11/18/30	6.49	6.50	9.80	64.39	7.32	5.50
foliage	6/3/31	9.94	1.55	7.45	69.87	7.45	3.74
foliage	7/14/31	7.45	2.44	8.95	69.23	7.80	4.13
foliage	8/29/31	7.19	3.61	7.87	69.70	6.78	4.85
foliage	9/26/31	6.50	4.01	8.08	68.62	7.69	5.10
foliage	10/21/31	8.14	4.84	7.81	65.54	8.63	5.04
foliage and buds	11/12/31	8.19	5.51	8.10	64.94	6.97	6.29
<i>Rhus virens</i> , evergreen sumac							
mature foliage	11/18/30	10.36	6.81	17.58	55.22	5.98	4.05
foliage	11/12/31	8.25	5.02	17.55	58.33	5.98	4.87
<i>Rhynchosia texana</i>							
flowering plants	7/14/31	16.48	2.91	25.07	41.55	7.47	6.52
mostly flowering plants	8/24/31	18.45	3.16	21.24	44.39	6.66	6.10
<i>Salsola pestifer</i> , Russian thistle							
tops of fruiting plants	8/6/31	17.64	1.08	18.61	39.04	7.79	15.84
<i>Salvia reflexa</i> , annual sage							
tops of pre-flowering plants	8/24/31	22.75	3.59	11.37	42.63	6.54	13.12
<i>Schrankia angustata</i> , shamevine							
green	6/2/31	25.97	2.03	21.78	37.13	7.96	5.13
<i>Scutellaria Drummondii</i> , Skullcap							
flowering	6/2/31	8.95	2.65	28.58	44.82	7.82	7.18

<i>Setaria macrostachys</i> , plains bristlegrass in head.....	7/15/31	18.05	2.21	25.62	34.86	7.06	12.20
<i>Sedum Nuttallianum</i> , stonecrop Preflowering.....	4/ 1/31	7.98	5.69	11.00	49.86	5.97	19.50
<i>Sida procumbens</i> flowering.....	6/ 2/31	17.42	1.57	16.02	47.16	8.82	9.01
<i>Simsia calva</i> fruiting plants.....	6/ 1/31	15.03	1.30	19.76	43.24	8.37	12.30
budding plants.....	8/28/31	18.68	1.17	17.29	40.14	8.37	14.35
<i>Siphonoglossa pilosella</i> flowering.....	8/31/31	20.00	3.51	19.68	33.56	6.93	16.32
<i>Sitanion hystrix</i> , squirreltail grass in head.....	4/30/31	11.54	1.74	33.82	39.95	7.17	5.78
<i>Solanum Torreyi</i> , Torrey horsenettle tops of flowering and fruiting plants.....	7/11/31	15.64	2.46	18.47	48.03	6.94	8.46
<i>Solanum elaeagnifolium</i> , trompillo tops of flowering plants.....	6/ 5/31	19.32	1.62	22.76	39.49	7.69	9.12
tops of flowering plants.....	7/14/31	25.28	1.75	23.77	35.25	7.26	6.69
tops of preflowering plants.....	8/24/31	21.78	1.68	21.23	37.06	5.99	12.26
tops with mature fruit.....	11/12/31	14.94	7.08	27.94	39.50	5.24	5.30
<i>Solanum triquetrum</i> flowering and fruiting.....	8/31/31	20.98	3.97	22.40	37.39	6.26	9.00
<i>Sophora secundiflora</i> , mesquite foliage.....	12/18/30	18.43	2.73	29.33	38.91	6.20	4.40
foliage.....	1/28/31	18.74	2.74	27.71	39.56	6.48	4.78
foliage.....	6/ 5/31	16.47	1.79	30.51	39.54	6.26	5.34
pod.....	6/ 5/31	16.94	.62	14.05	58.10	7.27	3.02
<i>Sorghum halepensis</i> , Johnson grass green second growth of stunted plants.....	7/14/31	18.55	3.48	22.98	38.62	7.12	9.25
<i>Sphaeralcea angustifolia cuspidata</i> , globemallow tops of flowering and fruiting plants.....	8/29/31	18.97	2.19	21.63	39.30	6.98	10.93
<i>Sporobolus cryptandrus</i> , sand dropseed grass plants in head.....	8/24/31	14.08	1.62	33.18	34.99	6.48	9.65
<i>Stipa leucotricha</i> , Texas needlegrass green growth of mature plants.....	6/ 2/31	7.24	1.45	32.82	44.58	7.11	6.80
luxuriant green growth.....	12/12/31	14.44	3.11	25.86	41.60	6.82	8.17
<i>Stillingia Treculeana</i> green growth of flowering plants.....	5/27/31	20.02	2.89	12.81	42.45	8.02	10.81
<i>Talinum aurantiacum</i> tops of flowering plants.....	8/24/31	21.55	2.82	12.60	39.36	7.28	16.39
<i>Thelesperma simplicifolium</i> green growth of flowering plants.....	6/ 2/31	9.33	1.53	31.25	46.04	7.07	4.78
<i>Tidestromia suffruticosa</i> flowering plants.....	9/11/31	14.77	1.25	20.51	44.56	8.77	10.14
<i>Tragia ramosa</i> green growth of flowering plants.....	6/ 2/31	14.60	2.22	18.99	49.65	7.96	6.58
fruiting plants.....	8/28/31	15.30	3.61	17.29	49.09	7.42	7.29
<i>Tribulus terrestris</i> , puncture plant green growth of fruiting plants.....	6/23/31	17.60	2.54	23.93	38.04	6.94	10.95

Table 1. Percentage Composition of Forage Plants of Sutton County, as Dried for Analysis—Continued.

Stage of growth or character of sample	Date collected	Protein	Ether extract	Crude fiber	Nitrogen free extract	Water	Ash
	1930-31						
Triodia albescens							
fruiting, approaching maturity	9/ 8/31	6.90	1.86	30.77	45.37	7.99	7.11
Trisetum interruptum							
green growth of maturing plants	4/26/31	8.85	1.55	28.65	41.29	6.90	12.76
Ungradiad speciosa, Mexican buckeye							
foliage	7/15/31	12.03	2.20	21.94	51.19	6.62	6.02
Verbena bipinnatifida, large flowered verbena							
green growth of fruiting plants	4/22/31	10.60	1.67	16.74	55.41	7.86	7.72
Verbena plicata, small flowered verbena							
green growth of flowering plants	6/ 2/31	10.85	3.14	5.99	63.24	7.70	9.08
fruiting plants	8/31/31	10.30	3.38	20.46	47.74	7.79	10.33
Vicia Leavenworthii (Leavenworthii), Stall vetch							
green growth of flowering plants	3/24/31	24.69	2.62	19.01	37.98	7.53	8.17
Xanthoxylum c.-h. fruticosum, prickly ash							
foliage	6/ 1/31	20.17	1.68	11.72	48.38	8.97	9.08
Yucca Reverchoni, yucca (buds)							
budding shoots	5/ 1/31	14.50	1.41	22.99	45.04	8.66	6.50
Yucca Reverchoni (flowers)							
flowers	6/ 2/31	19.06	3.51	12.57	46.84	10.18	7.84
Yucca Treguleana							
distal portion of leaves	2/28/31	11.01	1.74	33.09	36.17	8.44	9.55
Yucca Treguleana (buds)							
buds	3/24/31	22.66	1.22	13.18	46.47	8.35	8.12
Yucca Thompsoniana							
leaves without basal portion	3/ 2/31	7.60	1.69	42.29	37.60	7.17	3.65
Zexmania hispida							
green growth of flowering plants	6/ 4/31	11.10	1.19	23.48	40.42	8.67	15.14
budding plants	8/28/31	16.10	2.87	19.55	39.11	8.14	14.23

Table 2. Common and Botanical Names

Common name	Botanical name
Agrito.....	Berberis trifoliata
Angel trumpets.....	Acleisanthes longiflora
Ash, prickly.....	Xanthoxylum c.-h. fruticosum
Barley, little.....	Hordeum pusillum
Beardgrass, silver.....	Andropogon saccharoides
Bermuda grass.....	Cynodon dactylon
Bitterweed, poison.....	Actinea odorata
Bladderpod, Gordon.....	Lesquerella Gordoni
Bluebonnet.....	Lupinus texensis
Blueweed.....	Helianthus ciliaris
Bower, Texas virgin.....	Clematis Drummondii
Bristlegrass, plains.....	Setaria macrostachys
Buckeye, Mexican.....	Ungnadia speciosa
Buffalo grass.....	Buchloe dactyloides
Cactus, spineless.....	Opuntia Ellisiana
Caltrop.....	Kallstroemia intermedia
Canada fleabone.....	Erigeron canadensis
Carrot, wild.....	Daucus pusillus
Catsclaw.....	Acacia Roemeriana
Catsclaw, fragrant.....	Mimosa fragrans
Centaury.....	Centaurium calycosum
Coneflower, prairie.....	Ratibida columnifera
Crab grass.....	Digitaria sanguinalis
Croton, annual.....	Croton monanthogynus
Croton, New Mexico.....	Croton neomexicanus
Curly mesquite grass.....	Hilaria belangeri
Dandelion, false.....	Pyrrhopappus carolinianus
Dropseed grass, sand.....	Sporobolus cryptandrus
Evax.....	Evax multicaulis
Evax.....	Evax prolifera
False dandelion.....	Pyrrhopappus carolinianus
Fanatory.....	Corydalis aurea occidentalis
Fescue grass, annual.....	Festuca octoflora
Feather fingergrass.....	Chloris virgata
Filaree.....	Erodium cicutarium
Fingergrass, feather.....	Chloris virgata
Fleabone, Canada.....	Erigeron canadensis
Geranium.....	Geranium carolinianum
Globemallow.....	Sphaeralcea angustifolia cuspidata
Gordon bladderpod.....	Lesquerella Gordoni
Gourd, prairie.....	Cucurbita foetidissima
Grama, hairy.....	Bouteloua hirsuta
Grama, red.....	Bouteloua trifida
Grama, side oats.....	Bouteloua curtipendula
Groundcherry, violet flowered.....	Physalis lobata
Guajillo, prairie.....	Acacia angustissima
Hackberry.....	Celtis reticulata
Honeysuckle, white-flowered.....	Lonicera albiflora
Heller plantain.....	Plantago Helleri
Horsenettle, Torrey.....	Solanum Torreyi
Ill-scented sumac.....	Rhus trilobata
Indian blanket.....	Gaillardia pulchella
Indian mallow.....	Abutilon incanum
Johnson grass.....	Sorghum halepensis
Jointfir.....	Ephedra antisiphilitica
Juniper, Pinchot.....	Juniperus Pinchoti
Jungle rice.....	Echinochloa colonum
Lechuguilla.....	Agave lecheguilla
Live oak.....	Quercus virginiana
Live oak dodder.....	Cuscuta exaltata
Lote bush.....	Condalia obtusifolia
Mallow, Indian.....	Abutilon incanum
Mallow, annual poppy.....	Callirrhoe pedata
Mariola.....	Parthenium incanum
Mercury, slender three-seeded.....	Acalypha gracilens
Mescalbean.....	Sophora secundiflora
Mesquite tree.....	Prosopis chilensis
Mesquite grass, curly.....	Hilaria belangeri
Mesquite grass, vine.....	Panicum obtusum
Mexican buckeye.....	Ungnadia speciosa
Mexican persimmon.....	Diospyros texana
Milkvetch, Nuttall.....	Astragalus Nuttallianus
Milkvetch, thin.....	Astragalus macilentus
Mulberry.....	Morus microphylla
Mustard, tansy.....	Descurainia pinnata

Table 2. Common and Botanical Names—Continued

Common name	Botanical name
Needlegrass, Texas	<i>Stipa leucotricha</i>
Nuttall milkvetch	<i>Astragalus Nuttallianus</i>
Oak, live	<i>Quercus virginiana</i>
Oak dodder, live	<i>Cuscuta exaltata</i>
Oak, shin	<i>Quercus brevifolia</i>
Onion, white	<i>Allium Drummondii</i>
Panic grass, Hall	<i>Panicum Hallii</i>
Peppergrass, Wright	<i>Lepidium lasiocarpum</i> Wrightii
Persimmon, Mexican	<i>Diospyros texana</i>
Plains bristlegrass	<i>Setaria macrostachys</i>
Plantain, bracted	<i>Plantago spinulosa</i>
Plantain, Heller	<i>Plantago Helleri</i>
Plantain, redseeded	<i>Plantago, rhodosperma</i>
Plum, small flowered	<i>Prunus minutiflora</i>
Poison bitterweed	<i>Actinea odorata</i>
Prairie coneflower	<i>Ratibida columnifera</i>
Prairie gourd	<i>Cucurbita foetidissima</i>
Prairie guajillo	<i>Acacia angustissima</i>
Prickly ash	<i>Xanthoxylum c.-h. fruticosum</i>
Prickly pear	<i>Opuntia atropina</i>
Primrose, evening	<i>Oenothera Greggii</i> lampsana
Primrose, evening	<i>Oenothera serrulata</i> Drummondii flava
Primrose, showy evening	<i>Oenothera speciosa</i>
Puncture plant	<i>Tribulus terrestris</i>
Purslane	<i>Portulaca retusa</i>
Ragweed	<i>Ambrosia psilostachya</i>
Rescue grass	<i>Bromus catharticus</i>
Rice, jungle	<i>Echinochloa colonum</i>
Russian thistle	<i>Salsola pestifer</i>
Rye, wild	<i>Elymus brachystachys</i>
Sacahuiste	<i>Nolina texana</i>
Sage, annual	<i>Salvia reilexa</i>
Sand dropseed grass	<i>Sporobolus cryptandrus</i>
Sedge, thicket	<i>Carex planostachys</i>
Senna, Roemer	<i>Cassia Roemeriana</i>
Shamevine	<i>Schrankia angustata</i>
Shin oak	<i>Quercus brevifolia</i>
Silver beardgrass	<i>Andropogon saccharoides</i>
Skullcap	<i>Scutellaria Drummondii</i>
Slender three-seeded mercury	<i>Acalypha gracilens</i>
Snakeroot, dotted button	<i>Liatris punctata</i>
Snakeweed (perennial)	<i>Gutierrezia microcephala</i>
Snakeweed (annual)	<i>Gutierrezia texana</i>
Sneezeweed, small headed	<i>Helenium microcephalum</i>
Sotol	<i>Dasyliroa texanum</i>
Sprangletop	<i>Lepiochloa dubia</i>
Squirreltail grass	<i>Sitanion Hystrix</i>
Stall vetch	<i>Vicia Leavenworthii</i>
Stinkgrass	<i>Eragrostis cilianensis</i>
Stonecrop	<i>Sedum Nuttallianum</i>
Stork's bill, large-flowered	<i>Erodium texanum</i>
Sumac, evergreen	<i>Rhus virens</i>
Sumac, ill-scented	<i>Rhus, trilobata</i>
Sumac, small leaf	<i>Rhus microphylla</i>
Sunflower	<i>Helianthus annuus</i>
Tansy mustard	<i>Descurainia pinnata</i>
Tasajillo	<i>Opuntia leptocaulis</i>
Texas needlegrass	<i>Stipa leucotricha</i>
Thicket sedge	<i>Carex planostachys</i>
Thistle, Russian	<i>Salsola pestifer</i>
Thistle, southern pasture	<i>Cirsium austrinum</i>
Three-awn grass, purple	<i>Aristida purpurea</i>
Three-awn grass, Wright	<i>Aristida Wrightii</i>
Trompillo	<i>Solanum elaeagnifolium</i>
Unicorn plant	<i>Martynia louisianica</i>
Verbena, large flowered	<i>Verbena bipinnatifida</i>
Verbena, small flowered	<i>Verbena plicata</i>
Vetch, stall	<i>Vicia Leavenworthii</i>
Vine mesquite grass	<i>Panicum obtusum</i>
Violet flowered groundcherry	<i>Physalis lobata</i>
Whitlow wart	<i>Draba cuneifolia</i>
Witchgrass, fall	<i>Leptolema cognatum</i>
Wormwood, woolly	<i>Artemisia vulgaris</i> gnaphalodes
Yucca	<i>Yucca Reverchoni</i>

Table 3. Grades for Calcium, Phosphorus, and Protein in Forage for Range Animals
(All figures as per cent on air dry basis)

Protein		
Grade	Interpretation	Crude protein
1	High.....	15.00 +
2	Good.....	10.50 to 14.99
3	Fair.....	6.00 to 10.49
4	Deficient.....	3.00 to 5.99
5	Very deficient.....	0 to 2.99

Phosphorus (P) or phosphoric acid (P ₂ O ₅)			
		P	P ₂ O ₅
1	High.....	.45 +	1.01 +
2	Good.....	.30 to .44	.67 to 1.00
3	Fair.....	.15 to .29	.33 to .66
4	Deficient.....	.08 to .14	.17 to .32
5	Very deficient.....	0 to .07	0 to .16

Calcium (Ca) or lime (CaO)			
		Ca	CaO
1	High.....	.61 +	.83 +
2	Good.....	.31 to .60	.43 to .82
3	Fair.....	.16 to .30	.22 to .42
4	Deficient.....	.08 to .15	.11 to .21
5	Very deficient.....	0 to .07	0 to .10

Table 2 and are the same as those previously used in Bulletin 582. The grades of the constituents of the samples analyzed are given in Table 3, and enable comparisons between the different kinds of vegetation to be easily made. Since some workers report their analyses in terms of phosphorus (P) instead of phosphoric acid (P₂O₅) and in terms of calcium (Ca) instead of lime (CaO), these are also given in Table 2.

Vegetation Consumed by Range Animals

The approximate percentages of the different kinds of vegetation consumed by cattle is given in Tables 5 and 6, by sheep in Table 7 and 8, and by goats in Table 9 and 10.

The tables show that the cattle consume the smallest number of different kinds of plants, the sheep next, while the goats consume a much larger number of different kinds of plants. This diversity of choice would no doubt give the goats an advantage in times of scarcity of feed, or when there is danger of over grazing. The cattle would be more likely to suffer first.

The relation of the kinds of plants eaten to the season is also shown in Tables 5, 6, 7, 8, 9 and 10. Curly mesquite makes a large part of the rations of the cattle except in December, January, March and April. Live oak leaves were consumed in appreciable quantities in November, December, and January, with a maximum in January. Sacahuiste was consumed in large quantities in December, and in appreciable quantities in January, February and March. Texas needle grass (*Stipa leucotricha*) made up approximately 32% of the feed in January, but almost none was consumed in the other months. Appreciable amounts of buffalo grass (*Buchloe dactyloides*) were available and were consumed in May (45%) and some in June (17%) but none in the other months. Plants such as *Astragalus Nuttallianus*, *A. macilentus*, *Plantago rhodosperma* and *P. Helli* made up 52% of the ration in March and 58% in April, but in other months of the year the grasses were of more importance than the forbs as feed for cattle. Although curly mesquite grass was the main ingredient of the ration, at some seasons of the year the cattle ate considerable quantities of other vegetation, probably partly from necessity and partly from choice.

Buffalo grass grows near Sonora only in lake beds and along draws where moisture conditions are favorable enough to permit it to grow and in these favorable habitats it crowds out the curly mesquite grass. In two of the months the livestock had opportunity to feed upon buffalo grass while such was not the case in the other months. It is known, however, that buffalo grass is more palatable than curly mesquite and that all livestock having the opportunity of choice will feed upon buffalo grass rather than curly mesquite. Buffalo grass has green growth for a longer season than does curly mesquite. Our figures therefore do not accurately set up the value of buffalo grass as forage during the various months of the year.

The sheep, like the cattle, consumed quantities of curly mesquite, sacahuiste, and live oak leaves, but at some seasons the bulk of the ration was composed of other kinds of vegetation. They also consumed vegetation different from that of the cattle, so that the sheep had more choice in their feeding.

The goats consumed vegetation not eaten by cattle or sheep, in addition to plants eaten by both. A long list of plants, eaten in larger or smaller amounts, is given in Table 6 for goats.

The various forbs (herbaceous plants eaten by animals) that are forage plants are somewhat similar in forage value and otherwise are important as forage in the late winter and early spring months. When growing intimately in grass land and in abundance in the months of March and April they supply a major portion of the grazing for cattle. However, if these forbs do not grow in an intimate mixture with green and succulent grass, cattle do not feed upon them to any appreciable extent. On the other hand both sheep and goats feed quite heavily upon the forbs.

Table 4. Minerals and Grades of Protein, Lime and Phosphoric Acid in Forage Plants

Name	Date Collected	Per cent				Grades		
		Potash	Lime	Magnesia	Phosphoric acid	Protein	Lime	Phosphoric acid
Abutilon incanum	6/13	3.30	2.58	.87	.55	1	1	3
Abutilon incanum	8/24	2.74	3.02	.89	.60	1	1	3
Acacia angustissima	5/1	1.50	.87	.25	.73	1	1	2
Acacia angustissima	7/15	1.36	1.66	.38	.50	1	1	3
Acacia Roemeriana	6/1	1.14	1.45	.40	.46	1	1	3
Acacia Roemeriana	7/14	1.22	2.50	.45	.37	1	1	3
Acalypha gracilens	8/28	2.10	2.95	.57	.40	2	1	3
Acleisanthes longiflora	7/14	3.81	3.47	.88	.32	1	1	4
Actinea odorata, poison bitterweed	1/23	2.40	2.40	.....	.84	1	1	2
Actinea odorata, poison bitterweed	2/24	4.99	2.28	.54	1.07	1	1	1
Actinea odorata, poison bitterweed	4/1	2.85	1.34	.32	.42	2	1	3
Actinea scaposa linearis	6/2	2.82	2.71	.38	.39	2	1	3
Agave lecheguilla	2/27	.85	5.74	.46	.23	3	1	4
Allium Drummondii	4/30	1.94	2.30	.25	.44	2	1	3
Alternanthera repens	8/24	4.20	3.98	.96	.63	1	1	3
Amaranthus Berlandieri	8/24	4.67	5.37	1.28	.84	1	1	2
Amaranthus blitoides	6/1	5.88	5.50	1.41	1.05	1	1	1
Amaranthus blitoides	8/24	5.13	4.19	.95	.39	1	1	3
Amaranthus Palmeri	8/24	4.71	2.96	.81	.85	1	1	2
Amaranthus retroflexus, Pig weed	6/1	5.77	5.13	1.60	1.09	1	1	1
Ambrosia psilostachya, ragweed	6/3	4.39	4.26	.75	.69	1	1	2
Andropogon cirratus	9/28	.58	.37	.18	.14	4	3	5
Andropogon saccharoides, Silver beardgrass	6/4	1.12	.86	.26	.34	3	1	3
Andropogon saccharoides, Silver beardgrass	7/13	1.99	.58	.25	.49	3	2	3
Andropogon saccharoides, Silver beardgrass	11/11	.55	.64	.....	.13	4	2	5
Aphanostephus humilis	4/30	3.07	1.79	.32	.50	2	1	3
Aphanostephus humilis	5/23	2.82	1.35	.30	.42	3	1	3
Aphanostephus humilis	7/14	3.27	1.94	.32	.62	2	1	3
Aristida purpurea, Purple three-awn grass	9/26	.75	.59	.16	.25	4	2	4
Aristida purpurea, Purple three-awn grass	10/19	.74	.78	.22	.28	4	2	4
Aristida purpurea, Purple three-awn grass	11/13	.43	.61	.19	.16	3	2	5
Aristida purpurea, Purple three-awn grass	12/14	.36	.45	.15	.18	3	2	4
Aristida sp., Three-awn grass	11/20	.30	.48	.15	.22	3	2	4
Aristida sp., Three-awn grass	12/19	.42	1.04	.24	.27	3	1	4
Aristida sp., Three-awn grass	2/3	.32	.54	.10	.23	3	2	4
Aristida sp., Three-awn grass	2/25	.55	.86	.12	.26	3	1	4
Aristida Wrightii, Wright three-awn grass	6/4	.61	.38	.14	.21	3	3	4
Aristida Wrightii, Wright three-awn grass	8/24	.70	.61	.19	.35	3	2	3
Aristida Wrightii, Wright three-awn grass	9/26	.72	.44	.14	.23	4	2	4
Artemisia vulgaris gnaphalodes	7/13	2.46	1.12	.41	.41	2	1	3
Aster ericoides	9/28	1.03	3.15	.43	.21	3	1	4

Table 4. Minerals and Grades of Protein, Lime and Phosphoric Acid in Forage Plants—Continued

Name	Date collected	Per cent				Grades		
		Potash	Lime	Magnesia	Phosphoric acid	Protein	Lime	Phosphoric acid
<i>Astragalus Nuttallianus</i> , Wild pea vine.....	3/24	3.31	2.18	.35	.64	1	1	3
<i>Astragalus macilentus</i>	3/23	2.90	2.07	.34	.48	1	1	3
<i>Avena sativa</i> , Oats (young).....	12/18	6.34	1.01	.42	.87	1	1	2
<i>Berberis trifoliata</i>	11/19	.91	.88	.24	.34	3	1	3
<i>Boerhaavia tenuifolia</i>	8/28	1.54	4.77	.42	.24	2	1	4
<i>Bouteloua curtipendula</i> , Side oats grama.....	12/19	.39	.71	.19	.18	3	2	4
<i>Bouteloua curtipendula</i> , Side oats grama.....	7/13	1.20	.59	.21	.22	3	2	4
<i>Bouteloua trifida</i> , Red grama.....	9/26	.67	.79	.22	.21	3	2	4
<i>Bouteloua hirsuta</i> , Hairy grama.....	8/31	.98	.55	.21	.28	3	2	4
<i>Bromus catharticus</i> , Rescue grass.....	3/23	3.11	.57	.19	.71	2	2	2
<i>Bromus catharticus</i> , Rescue grass.....	5/1	1.28	.33	.15	.57	2	3	3
<i>Bromus catharticus</i> , Rescue grass.....	2/24	4.23	.68	.25	.80	1	2	2
<i>Buchloe dactyloides</i> , Buffalo grass.....	5/28	1.07	.73	.27	.40	2	2	3
<i>Buchloe dactyloides</i> , Buffalo grass.....	10/20	.62	.88	.23	.40	3	1	3
<i>Buchloe dactyloides</i> , Buffalo grass.....	11/19	.50	.60	.18	.36	3	2	3
<i>Buchloe dactyloides</i> , Buffalo grass.....	12/19	.40	.47	.15	.31	3	2	4
<i>Buchloe dactyloides</i> , Buffalo grass.....	4/30	1.16	.65	.22	.52	2	2	3
<i>Buchloe dactyloides</i> , Buffalo grass.....	6/1	.93	.57	.21	.61	2	2	3
<i>Buchloe dactyloides</i> , Buffalo grass.....	7/9	.94	.82	.29	.63	2	2	3
<i>Buchloe dactyloides</i> , Buffalo grass.....	8/31	.72	.68	.19	.47	3	2	3
<i>Bumelia texana</i>	11/18	.65	4.01	.38	.26	2	1	4
<i>Callirhoe pedata</i>	6/2	2.49	3.18	.39	.95	3	1	2
<i>Carex planostachys</i> , Sedge.....	11/20	1.15	1.12	.24	.34	2	1	3
<i>Carex planostachys</i> , Sedge.....	2/25	1.14	.98	.20	.31	2	1	4
<i>Carex planostachys</i> , Sedge.....	11/12	.88	.81	.....	.16	4	2	5
<i>Carex planostachys</i> , Sedge.....	12/14	.72	.89	.21	.17	3	1	4
<i>Carex stipa</i>	1/24	1.10	1.08	.22	.31	2	1	4
<i>Cassia Roemeriana</i>	7/9	1.38	6.64	.46	.37	1	1	3
<i>Cassia Roemeriana</i>	8/28	1.70	4.65	.46	.46	1	1	3
<i>Caura parviflora</i>	5/1	3.71	3.57	1.06	1.00	1	1	2
<i>Celtis reticulata</i>	6/3	1.52	6.27	.70	.38	2	1	3
<i>Centaurium calycosum</i>	6/2	1.51	.36	.29	.36	3	3	3
<i>Chamaesaracha sordida</i>	9/5	4.64	3.14	.96	.59	1	1	3
<i>Chenopodium albesens</i>	5/1	9.81	4.36	1.21	1.09	1	1	1
<i>Chloris virgata</i> , Feather finger grass.....	8/31	3.29	.97	.38	.34	3	1	3
<i>Chloris</i> sp., Finger grass.....	8/24	4.43	.82	.44	.42	2	2	3
<i>Cirsium austrinum</i>	5/1	3.51	5.47	.63	.45	1	1	3
<i>Clematis Drummondii</i>	8/31	1.74	1.92	.29	.45	2	1	3
<i>Colubrina texensis</i>	11/19	1.80	3.56	.34	.44	1	1	3
<i>Colubrina texensis</i>	11/12	1.04	4.93	.....	.27	1	1	4
<i>Condalia obtusifolia</i> , lote bush.....	6/4	2.31	1.50	.39	.54	1	1	3

<i>Condalia obtusifolia</i> , lote bush	7/15	3.03	2.40	.55	.38	1	1	3
<i>Corydalis aurea occidentalis</i>	12/18	4.72	3.22	.56	1.52	1	1	1
<i>Croton corymbulcus</i>	6/5	1.57	2.01	.45	.35	1	1	1
<i>Croton monanthogynus</i>	6/2	2.84	3.08	.70	.46	1	1	1
<i>Croton monanthogynus</i>	8/31	1.76	3.12	.62	.46	1	1	1
<i>Croton monanthogynus</i>	9/28	1.47	2.28	.42	.22	3	1	1
<i>Croton monanthogynus</i>	10/20	1.21	3.23	.72	.32	2	1	1
<i>Croton neomexicanus</i>	10/3	1.31	2.82	.64	.30	1	1	1
<i>Cucurbita foetidissima</i>	7/15	2.82	10.04	1.68	.55	1	1	1
<i>Cuscuta exaltata</i>	7/13	1.40	.15	.10	.27	3	4	4
<i>Cynodon dactylon</i> , Bermuda grass	10/21	1.61	1.03	.27	.58	3	1	1
<i>Cynodon dactylon</i> , Bermuda grass	11/20	1.30	1.00	.23	.51	3	1	1
<i>Cynodon dactylon</i> , Bermuda grass	12/19	.96	.84	.21	.49	3	1	1
<i>Cynodon dactylon</i> , Bermuda grass	6/3	3.19	.94	.26	.74	1	1	2
<i>Cynodon dactylon</i> , Bermuda grass	7/9	2.39	.75	.22	.48	2	2	3
<i>Cynodon dactylon</i> , Bermuda grass	8/31	1.78	.65	.22	.39	3	2	3
<i>Cynodon dactylon</i> , Bermuda grass	10/20	2.16	1.26	.53	.65	2	1	1
<i>Cynodon dactylon</i> , Bermuda grass	11/11	1.84	1.03	.33	.35	2	1	1
<i>Cynodon dactylon</i> , Bermuda grass	12/12	.62	.78	.24	.43	3	2	3
<i>Dasyliion texanum</i>	2/27	.85	.90	.17	.18	3	1	4
<i>Daucus pusillus</i>	5/1	3.66	2.42	.43	.60	2	1	1
<i>Daucus pusillus</i>	6/17	2.02	3.56	.46	.86	3	1	2
<i>Descurainia pinnata</i>	2/25	4.90	2.52	.48	1.45	1	1	1
<i>Desmanthus fallax</i>	6/2	2.01	1.63	.51	.40	1	1	3
<i>Digitaria sanguinalis</i> , Crab grass	7/9	5.16	1.08	.75	.63	2	1	3
<i>Digitaria sp.</i> , Crab grass	8/24	4.33	.68	.48	.43	2	2	3
<i>Diospyros texana</i>	10/16	.81	5.16	.88	.20	2	1	4
<i>Diospyros texana</i>	6/1	1.52	3.32	.65	.35	1	1	3
<i>Diospyros texana</i>	10/20	1.39	7.68	.71	.19	3	1	4
<i>Draba cuneifolia</i>	2/21	1.96	4.24	.35	.70	2	1	2
<i>Echinochloa colonum</i> , Jungle rice	8/24	4.15	1.09	.81	.51	1	1	3
<i>Elymus brachystachys</i>	6/2	2.18	.47	.20	.44	2	2	2
<i>Engelmannia pinnatifida</i>	2/25	5.31	3.42	.51	.78	1	1	2
<i>Engelmannia pinnatifida</i>	4/29	4.62	2.15	.42	.58	2	1	3
<i>Ephedra antisiphilitica</i> , Jointfir	3/1	.71	4.05	.26	.18	3	1	4
<i>Eragrostis cilianensis</i> , Strong-scented love-grass	8/24	1.81	1.24	.40	.51	2	1	3
<i>Erigeron canadensis</i> , Horseweed	8/6	3.14	1.42	.34	.65	2	1	3
<i>Eriochloa contracta</i>	9/5	3.34	.87	.55	.46	2	1	3
<i>Erodium cicutarium</i> , Alfileria	2/27	4.77	4.56	.49	.99	1	1	2
<i>Erodium texanum</i>	2/24	2.61	2.69	.34	.56	1	1	3
<i>Erodium texanum</i>	2/27	2.40	2.31	.35	.49	2	1	3
<i>Euphorbia dictyosperma</i>	3/30	2.16	1.54	.41	.54	1	1	3
<i>Euphorbia stictospora</i>	8/24	2.04	2.96	.49	.51	2	1	3
<i>Evax multicaulis</i>	3/30	2.27	3.33	.55	.38	2	1	3
<i>Evax multicaulis</i>	5/15	2.68	1.33	.46	.62	3	1	3
<i>Evax prolifera</i>	6/2	1.19	2.64	1.93	.46	3	1	3
<i>Festuca octoflora</i> , Slender fescue	3/23	2.63	.59	.32	.79	1	2	2
<i>Festuca octoflora</i> , Slender fescue	4/26	1.22	.62	.22	.43	3	2	3
Forbs, mixed	10/18	2.95	4.40	.89	.58	1	1	3
Forbs, mixed	12/18	4.09	3.47	.71	1.31	1	1	1

Table 4. Minerals and Grades of Protein, Lime and Phosphoric Acid in Forage Plants—Continued

Name	Date collected	Per cent				Grades		
		Potash	Lime	Magnesia	Phosphoric acid	Protein	Lime	Phosphoric acid
Forbs, mixed	2/3	2.72			.74	1		2
Forestiera neomexicana	3/30	2.59	.97	.31	.75		1	2
Forestiera neomexicana	6/4	3.12	1.64	.54	.31	2	1	4
Forestiera neomexicana	7/15	2.80	1.74	.44	.25	3	1	4
Gaillardia pulchella, Firewheel	6/4	3.64	3.47	.31	.60	2	1	3
Gaura coccinea	6/17	2.12	2.56	.45	.33	2	1	3
Gaura coccinea	8/31	2.15	2.47	.65	.37	2	1	3
Geranium carolinianum	4/30	2.40	1.73	.38	1.20	2	1	1
Grasses, mixed	12/18	1.27	.93	.22	.33	2	1	3
Gutierrezia microcephala	10/3	1.51	.96	.24	.29	3	1	4
Gutierrezia texana, annual Snakeweed	6/1	3.34	.85	.33	.36	2	1	3
Hedeoma Drummondii	6/2	1.90	2.55	.47	.40	3	1	3
Helenium microcephalum, sneezeweed	4/22	4.35	3.12	.28	.56	1	1	3
Helianthus annuus, Sunflower	7/14	4.60	5.21	.71	.43	1	1	3
Helianthus ciliaris, Blueweed	7/15	4.95	2.74	1.04	.47	2	1	3
Hilaria Belangeri, curly mesquite	10/20	.89	.88	.48	.56	1	1	3
Hilaria Belangeri, curly mesquite	10/21	.47	.65	.22	.34	3	2	3
Hilaria Belangeri, curly mesquite	11/19	1.02	.69	.19	.44	3	2	3
Hilaria Belangeri, curly mesquite	12/19	.37	.78	.59	.26	3	2	4
Hilaria Belangeri, curly mesquite	1/23	.23	.58	.10	.20	3	2	4
Hilaria Belangeri, curly mesquite	2/25	.19	.48	.11	.18	4	2	4
Hilaria Belangeri, curly mesquite	6/2	.94	.76	.21	.37	3	2	3
Hilaria Belangeri, curly mesquite	7/9	1.40	.77	.26	.45	3	2	3
Hilaria Belangeri, curly mesquite	8/31	1.25	1.10	.25	.36	3	1	3
Hilaria Belangeri, curly mesquite	9/22	1.13	.88	.21	.24	3	1	4
Hilaria Belangeri, curly mesquite	10/19	1.06	.76	.22	.25	3	2	4
Hilaria Belangeri, curly mesquite	11/13	.47	1.35	.16	.27	4	2	4
Hilaria Belangeri, curly mesquite	12/14	.28	.52	.12	.16	3	1	5
Hordeum pusillum, Little barley	4/30	1.63	.36	.23	.69	3	3	2
Hoffmanseggia brachycarpa	8/28	1.35	4.11	.32	.39	2	1	3
Houstonia angustifolia	10/20	.76	1.38	.24	.18	3	1	4
Juniperus Pinchoti	12/18	1.21	1.22	.19	.28	4	1	4
Juniperus Pinchoti	3/24	.59	2.36	.26	.28	3	1	4
Kallstroemia intermedia	6/17	3.43	5.74	.46	.50	1	1	3
Krameria secundiflora, Ratany	6/4	1.84	1.30	.29	.42	2	1	3
Krigeron canadensis	8/6	3.14	1.42	.34	.65	2	1	3
Lepidium lasiocarpum Wrightii	1/24	3.74	3.17	1.02	1.30	1	1	1
Lepidium lasiocarpum Wrightii	2/24	3.36	1.89	.47	1.25	1	1	1
Lepidium lasiocarpum Wrightii	3/23	2.52	2.05	.50	.85	1	1	2
Lepidium lasiocarpum Wrightii	4/29	2.03	1.95	.59	.75	1	1	2
Leprochloa dubia, Texas crowfoot	8/31	2.09	.53	.26	.50	2	2	3

Leptoloma cognatum, Fall witch grass.....	6/ 2	1.94	.75	.57	.40	2	2	3
Leptoloma cognatum, Fall witch grass.....	9/22	3.57	.64	.45	.21	3		4
Lesquerella Gordoni.....	2/24	2.27	6.42	.50	.73	1	1	2
Lesquerella Gordoni.....	3/24	1.85	5.94	.43	.52	1	1	3
Leucaena retusa.....	7/14	1.44	3.62	.33	.26	1	1	4
Leucophyllum minus.....	8/18	.79	1.0	.21	.22	3	1	4
Liatris Pycnostachya.....	10/ 3	1.04	1.72	.49	.23	3	1	4
Limnodea arkansana.....	4/30	1.97	.44	.22	.40	2	2	3
Lonicera albiflora.....	6/ 4	2.63	3.54	.79	.29	3	1	4
Lupinus texensis.....	5/ 1	1.90	5.08	.47	.36	2	1	3
Lupinus texensis (flowers).....	5/ 1	1.88	1.53	.39	.63	1	1	3
Martynia louisianica.....	7/11	3.63	3.06	.87	.57	1	1	3
Melampodium leucanthum.....	8/28	3.24	2.25	.60	.39	2	1	3
Mimosa fragrans, Catclaw.....	8/29	1.28	3.11	.50	.36	1	1	3
Morus microphylla.....	7/15	2.20	5.98	.81	.35	2	2	3
Nama hispidum.....	6/ 3	2.23	5.42	.58		2	1	1
Nama jamaicense.....	5/ 1	3.48	7.49	.81	.49	1	1	3
Nolina texana (Sacahuiste).....	11/20	.80	1.79	.59	.25	3	1	4
Nolina texana (upper leaves).....	12/18	.71	.92	.19	.22	3	1	4
Nolina texana (after burned).....	12/18	.93	.64	.21	.29	3	2	4
Nolina texana (leaves and base).....	12/18	.64	2.03	.29	.17	4	1	4
Nolina texana (distal and foliage).....	1/28	.61	.88	.14	.18	4	1	4
Nolina texana (whole leaves).....	1/28	.59	1.57	.23	.17	4	1	4
Nolina texana (foliage).....	2/25	.72	1.90	.24	.20	4	1	4
Nolina texana.....	10/21	.93	.82	.17	.18	4	2	4
Nolina texana.....	11/13	.98	.95	.22	.18	4	1	4
Nolina texana.....	12/12	1.01	.60	.18	.17	4	2	4
Nolina texana (Sacahuiste) (buds).....	2/25	3.10	.52		1.03	1	2	1
Nolina texana (Sacahuiste) (buds).....	3/23	3.20	.54	.25	.90	1	2	2
Oenothera serrulata Drummondii.....	5/ 1	1.41	1.56	.42	.39	3	1	3
Oenothera Greggii lampsona.....	5/ 1	1.54	2.99	.49	.35	2	1	3
Oenothera speciosa.....	5/ 1	3.90	2.28	.56	.78	1	1	2
Oenothera speciosa.....	7/15	2.61	2.68	.59	.62	2	1	3
Opuntia Ellisiana, Spineless cactus.....	12/18	1.67	16.20	1.51	.12	5	1	5
Opuntia Ellisiana, Spineless cactus.....	1/24	2.31	15.13	1.95	.14	5	1	5
Opuntia leptocaulis.....	12/18	2.55	14.49	1.15	.26	3	1	4
Opuntia leptocaulis.....	1/24	3.11	11.37	1.46	.31	4	1	4
Opuntia sp.....	12/18	2.59	13.85	1.59	.24	3	1	4
Opuntia sp.....	1/23	3.48	9.43	1.74	.41	3	1	3
Opuntia sp.....	9/ 8	1.77	2.84	.44	.22	4	1	4
Opuntia sp. (buds and young fruit).....	6/ 2	3.63	5.46	1.18	.54	2	1	3
Panicum fasciculatum reticulatum.....	6/23	4.82	.84	.54	.59	1	1	3
Panicum fasciculatum reticulatum.....	8/24	4.21	.76	.65	.58	1	2	3
Panicum Hallii.....	8/31	1.71	.68	.50	.37	2	2	3
Panicum hirticaule.....	7/15	1.90	.63	.47	.39	2	2	3
Panicum obtusum, Grapevine mesquite.....	2/ 3	1.95	.90	.35	.41	2	1	3
Panicum obtusum, Grapevine mesquite.....	6/ 2	3.54	.82	.34	.67	1	2	2
Panicum obtusum, Grapevine mesquite.....	8/24	2.89	1.06	.51	.43	2	1	3
Parosella frutescens.....	7/14	1.35	2.94	.37	.30	1	1	4
Parthenium Hysterophorus.....	6/13	6.38	3.42	.39	.72	1	1	2

Table 4. Minerals and Grades of Protein, Lime and Phosphoric Acid in Forage Plants—Continued

Name	Date collected	Per cent				Grades		
		Potash	Lime	Magnesia	Phosphoric acid	Protein	Lime	Phosphoric acid
Parthenium Hysterophorus	9/ 5	1.61	2.39	.32	.64	1	1	3
Parthenium incanum	8/18	1.86	3.84	.44	.34	1	1	3
Paspalum distichum, Joint grass	9/ 8	2.63	.56	.27	.51	3	2	3
Pennisetum clandestinum	8/24	5.15	.78	.43	.61	1	2	3
Petalostemum multiflorum	6/17	1.56	2.25	.35	.32	2	1	4
Phacelia Popei	2/27	3.35	4.99	.54	.68	1	1	2
Phalaris angusta	5/ 1	3.02	.66	.41	.54	1	2	3
Phlox Rosmeriana	5/ 1	3.53	1.87	.28	.66	2	1	3
Physalis lobata	7/14	6.74	2.80	.87	.77	1	1	2
Pinaropappus rosens	6/ 2	2.76	1.42	.36	.44	2	1	3
Plantago Helleri	4/30	1.43	1.20	.29	.38	3	1	3
Plantago rhodosperma	2/24	3.19	8.45	.36	.48	1	1	3
Plantago rhodosperma	3/30	3.53	6.52	.35	.30	2	1	4
Plantago rhodosperma	5/ 1	2.10	4.87	.36	.37	3	1	3
Plantago Purshii, Indian wheat	3/23	1.65	1.23	.34	.36	2	1	3
Portulaca Retusa	8/29	6.09	3.72	1.32	.69	3	1	2
Prosopis chilensis (Mesquite tree foliage)	10/17	1.48	3.97	.47	.41	1	1	3
Prosopis chilensis (Mesquite tree foliage)	6/ 1	1.51	1.13	.32	.53	1	1	3
Prosopis chilensis (Mesquite tree foliage)	7/14	1.70	2.16	.34	.38	1	1	3
Prosopis chilensis (Mesquite tree foliage)	8/29	1.64	2.87	.32	.30	1	1	4
Prosopis chilensis (pods) Mesquite tree	10/20	1.58	.80	.14	.48	1	2	3
Prosopis chilensis (pods) Mesquite tree	9/25	1.66	.94	.22	.40	2	1	3
Prunus minutiflora	10/17	1.71	3.97	.40	.79	1	1	2
Prunus minutiflora	11/18	2.11	2.21	.47	.57	1	1	3
Prunus minutiflora	6/ 1	1.80	1.69	.51	.37	1	1	3
Pyrrhopappus carolinianus	6/ 4	4.02	1.87	.38	.65	2	1	3
Quercus brevifolia, Shin oak	10/18	.46	2.46	.31	.26	3	1	4
Quercus brevifolia, Shin oak	11/19	1.56	2.98	.39	.21	3	1	4
Quercus brevifolia, Shin oak	6/ 3	.97	1.01	.31	.33	2	1	3
Quercus brevifolia, Shin oak	7/13	.71	1.84	.28	.20	3	1	4
Quercus brevifolia, Shin oak	8/29	.85	2.76	.43	.25	3	1	4
Quercus brevifolia, Shin oak	9/28	.67	1.42	.23	.19	3	1	4
Quercus brevifolia, Shin oak	10/20	.72	2.32	.30	.20	3	1	4
Quercus brevifolia, Shin oak	11/11	.52	2.07	.....	.17	3	1	4
Quercus brevifolia, Shin oak	12/14	.55	3.50	.36	.19	3	1	4
Quercus virginiana (foliage)	10/18	.77	3.02	.42	.22	3	1	4
Quercus virginiana (foliage)	10/16	1.84	.31	.18	.23	4	3	4
Quercus virginiana (foliage)	11/19	2.12	.23	.15	.22	4	3	4
Quercus virginiana (foliage)	11/19	.76	1.81	.29	.25	3	1	4
Quercus virginiana (foliage)	12/18	.57	1.57	.24	.24	3	1	4
Quercus virginiana (foliage)	1/24	.51	2.55	.30	.25	3	1	4

<i>Quercus virginiana</i> (foliage).....	2/24	.66	1.57	.23	.28	3	1	4
<i>Quercus virginiana</i> (foliage).....	3/30	.96	2.95	.25	.19	3	1	3
<i>Quercus virginiana</i> (foliage).....	4/28	1.33	.88	.30	.59	1	1	4
<i>Quercus virginiana</i> (foliage).....	6/3	1.28	1.01	.28	.36	2	1	3
<i>Quercus virginiana</i> (foliage).....	7/13	.91	1.37	.27	.24	3	1	4
<i>Quercus virginiana</i> (foliage).....	8/29	.72	1.27	.47	.21	3	1	4
<i>Quercus virginiana</i> (foliage).....	9/26	.84	.33	.13	.20	4	3	4
<i>Quercus virginiana</i> (foliage).....	9/26	.98	1.76	.35	.20	3	1	4
<i>Quercus virginiana</i> (foliage).....	10/19	.58	1.37	.34	.23	3	1	4
<i>Quercus virginiana</i> (foliage).....	11/11	.75	2.21	.....	.18	3	1	4
<i>Quercus virginiana</i> (foliage).....	12/12	.80	2.46	.39	.21	3	1	4
<i>Quercus virginiana</i> (acorns).....	10/19	.83	.14	.10	.17	4	4	5
<i>Quercus virginiana</i> (acorns).....	11/11	.56	.20	.10	.14	4	4	5
<i>Quercus virginiana</i> (acorns).....	12/14	.75	.24	.12	.19	4	3	2
<i>Ratibida columnifera</i>	2/24	5.92	4.39	.79	.73	1	1	3
<i>Ratibida columnifera</i>	4/30	4.66	3.43	.48	.42	1	1	3
<i>Ratibida columnifera</i>	6/1	4.41	4.79	1.00	.50	1	1	3
<i>Ratibida columnifera</i>	11/12	1.44	2.36	.....	.65	2	1	3
<i>Rhus microphylla</i> , Sumac.....	11/19	2.41	3.56	.65	.30	2	1	4
<i>Rhus microphylla</i> , Sumac.....	6/1	1.60	1.49	.28	.40	1	1	3
<i>Rhus microphylla</i> , Sumac.....	7/13	1.51	1.85	.47	.32	1	1	4
<i>Rhus microphylla</i> , Sumac.....	8/29	2.71	2.87	.61	.29	2	1	4
<i>Rhus microphylla</i> , Sumac.....	10/21	2.36	2.98	.62	.50	2	1	3
<i>Rhus microphylla</i> , Sumac.....	11/12	1.34	3.18	.....	.23	2	1	4
<i>Rhus trilobata</i> , Illscented sumac.....	10/18	.76	3.67	.57	.28	3	1	4
<i>Rhus trilobata</i> , Illscented sumac.....	11/18	.91	3.04	.52	.18	3	1	4
<i>Rhus trilobata</i> , Illscented sumac.....	6/3	1.37	1.21	.30	.32	3	1	4
<i>Rhus trilobata</i> , Illscented sumac.....	7/14	1.00	1.71	.47	.21	3	1	4
<i>Rhus trilobata</i> , Illscented sumac.....	8/29	.86	2.65	.56	.19	3	1	4
<i>Rhus trilobata</i> , Illscented sumac.....	9/26	.91	2.51	.58	.17	3	1	4
<i>Rhus trilobata</i> , Illscented sumac.....	10/21	1.53	1.97	.47	.20	3	1	4
<i>Rhus trilobata</i> , Illscented sumac.....	11/12	.83	3.20	.....	.23	3	1	4
<i>Rhus virens</i>	11/18	.79	1.97	.36	.....	3	1	4
<i>Rhus virens</i>	11/12	.85	2.42	.....	.22	3	1	4
<i>Rhynchosia texana</i>	7/14	1.62	2.08	.38	.54	1	1	3
<i>Rhynchosia texana</i>	8/24	1.45	2.21	.37	.42	1	1	3
<i>Salsola pestifer</i> , Russian thistle.....	8/6	5.14	2.57	.76	.35	1	1	2
<i>Salvia reflexa</i>	8/24	5.22	2.11	.80	.83	1	1	2
<i>Schrankia angustata</i>	6/2	1.46	1.34	.48	.48	1	1	3
<i>Scutellaria Drummondii</i>	6/2	1.91	1.97	.55	.36	3	1	3
<i>Setaria macrostachys</i> , Foxtail grass.....	7/15	6.52	.54	.43	.67	1	2	2
<i>Sedum Nuttallianum</i>	4/1	2.99	9.88	.33	.87	3	1	3
<i>Sida procumbens</i>	6/2	1.98	3.36	.96	.54	1	1	3
<i>Simsia calva</i>	6/1	3.39	4.80	1.40	.45	1	1	3
<i>Simsia calva</i>	8/28	3.90	5.67	.94	.49	1	1	3
<i>Siphonoglossa pilosella</i>	8/31	4.39	7.21	1.08	.43	1	1	3
<i>Sitanion Hystrix</i> , Bottlebrush squirrel-tail.....	4/30	2.17	.48	.21	.42	2	2	3
<i>Solanum Torreyi</i>	7/11	3.07	2.56	.66	.35	1	1	3
<i>Solanum elaeagnifolium</i>	6/5	3.47	2.45	.51	.60	1	1	3
<i>Solanum elaeagnifolium</i>	7/14	3.52	1.61	.42	.77	1	1	2

Table 4. Minerals and Grades of Protein, Lime and Phosphoric Acid in Forage Plants—Continued

Name	Date collected	Per cent				Grades		
		Potash	Lime	Magnesia	Phosphoric acid	Protein	Lime	Phosphoric acid
<i>Solanum elaeagnifolium</i>	8/24	2.89	2.36	.47	.64	1	1	3
<i>Solanum elaeagnifolium</i>	12/14	2.44	1.42	.49	.49	2	1	3
<i>Solanum triquetrum</i>	8/31	3.12	3.64	.72	.56	1	1	3
<i>Sophora secundiflora</i>	12/18	.93	2.47	.30	.31	1	1	4
<i>Sophora secundiflora</i>	1/28	.86	2.71	.33	.31	1	1	4
<i>Sophora secundiflora</i>	6/5	1.23	2.66	.35	.29	1	1	4
<i>Sophora secundiflora</i>	6/5	1.29	.65	.26	.29	1	2	4
<i>Sorghum halepensis</i> , Johnson grass.....	7/14	3.49	.81	.39	.58	1	2	3
<i>Sphaeralcea angustifolia cuspidata</i>	8/29	3.01	4.35	.56	.65	1	1	3
<i>Sporobolus cryptandrus</i> , Dropseed grass.....	8/24	1.72	.56	.37	.54	2	2	3
<i>Stipa leucotricha</i> , Spear grass.....	6/2	1.33	.34	.14	.27	3	3	4
<i>Stipa leucotricha</i> , Spear grass.....	12/12	1.70	.75	.30	.39	2	2	3
<i>Stillingia Treculeana</i>	5/27	2.87	4.01	.64	.50	1	1	3
<i>Talinum aurantiacum</i>	8/24	5.95	3.90	2.08	.47	1	1	3
<i>Thelesperma simplicifolium</i>	6/2	1.79	1.69	.30	.32	3	1	4
<i>Tidestromia sulfruticosa</i>	9/11	3.64	3.07	.82	.28	2	1	4
<i>Tragia ramosa</i>	6/2	1.73	2.32	.53	.47	2	1	3
<i>Tragia ramosa</i>	8/28	1.70	2.84	.57	.47	1	1	3
<i>Tribulus terrestris</i>	6/23	3.19	4.36	.49	.52	1	1	3
<i>Triodia albescens</i>	9/8	1.79	.45	.17	.50	3	2	3
<i>Trisetum interruptum</i>	4/26	1.57	1.20	.23	.47	3	1	3
<i>Ungnadia speciosa</i>	7/15	1.39	3.17	.54	.36	2	1	3
<i>Verbena bipinnatifida</i>	4/22	1.78	2.56	.52	.37	2	1	3
<i>Verbena plicata</i>	6/2	1.69	3.19	.52	.37	2	1	3
<i>Verbena plicata</i>	8/31	1.85	3.75	.67	.32	3	1	4
<i>Vicia Leavenworthii</i> , Vetch.....	3/24	3.51	2.10	.40	.56	1	1	3
<i>Xanthoxylum c.-h. fruticosum</i>	6/1	3.30	2.69	.49	.54	1	1	3
<i>Yucca Reverchoni</i> (buds).....	5/1	2.53	1.49	.33	.80	2	1	2
<i>Yucca Reverchoni</i> (flowers).....	6/2	3.28	1.44	.48	1.04	1	1	1
<i>Yucca Treguleana</i>	2/28	1.96	4.90	.54	.36	2	1	3
<i>Yucca Treguleana</i> (buds).....	3/24	3.04	1.95	.42	1.35	1	1	1
<i>Yucca Thompsoniana</i>	3/2	.79	1.69	.27	.18	3	1	4
<i>Zexmania hispida</i>	6/4	3.47	3.75	.69	.38	2	1	3
<i>Zexmania hispida</i>	8/28	2.75	4.52	1.00	.42	1	1	3

Table 5. Percentages of Forages Eaten by Range Cattle

	October, 1930 %	November, 1930 %	December, 1930 %	January, 1931 %	February, 1931 %	March, 1931 %	April, 1931 %
Curly mesquite, <i>Hilaria Belangeri</i>	92	68	22	6	72	1	2
Live oak, <i>Quercus virginiana</i>		13	28	15	3		10
Sacahuiste, <i>Nolina texana</i>		7	46	38	21	24	
Needle grass, <i>Aristida</i> sp.....		4		32		1	
<i>Bromus catharticus</i>						17	
<i>Astragalus Nuttallianus</i> *.....						52	
<i>Plantago Helli</i> *.....							58
<i>Trisetum interruptum</i>							20
<i>Limnorea arkansana</i>							10
Ill-scented sumac, <i>Rhus trilobata</i>	2						
Mixed forbs.....	5						
Miscellaneous.....	1		4	7			
<i>Carex planostachys</i>		8			4	5	
Prickly pear, <i>Opuntia</i> sp.....				2			

*Taken as representative of the forage-plant forbs in general.

Table 6. Percentages of Forages Eaten by Range Cattle

	May, 1931 %	June, 1931 %	July, 1931 %	August, 1931 %	September, 1931 %	October, 1931 %	November, 1931 %	December, 1931 %
Curly mesquite, <i>Hilaria Belangeri</i>	45	65	94	80	98	67	78	22
Live oak, <i>Quercus virginiana</i>		1	1	6		5	15	29
Sacahuiste.....						18	2	45
<i>Buchloe dactyloides</i>	45	17		9				
<i>Quercus breviloba</i>	1	9		1		2		
<i>Rhus trilobata</i>			1		1		2	
<i>Carex planostachys</i>	2						1	1
<i>Stipa leucotricha</i>	3							2
<i>Aristida Wrightii</i>	3	3		1				
<i>Tragia ramosa</i>	1							
<i>Aphanostephus humilis</i>		2						
<i>Thelesperma simplicifolium</i>		1						
Miscellaneous.....		2						
<i>Prosopis chilensis</i>			4					
<i>Verbena plicata</i>				1				
<i>Chamaesaracha sordida</i>					1			
<i>Diospyros texana</i>						7		
<i>Houstonia angustifolia</i>						1		
<i>Colubrina texensis</i>							1	
<i>Aristida purpurea</i>							1	1

Table 7. Percentages of Forages Eaten by Range Sheep

	October, 1930 %	November, 1930 %	December, 1930 %	January, 1931 %	February, 1931 %	March, 1931 %	April, 1931 %
Curly mesquite, <i>Hilaria Belangeri</i>	90	58	58	25		2	10
Mixed forbs.....	5	23		20	20		
Live oak, <i>Quercus virginiana</i>		7	26	25	1		
Sacahuiste, <i>Nolina texana</i>			16	25			
<i>Festuca octoflora</i>					79	59	
<i>Astragalus macilentus</i>						19	
<i>Trisetum interruptum</i>							40
<i>Aphanostephus humilis</i>							50
<i>Carex planostachys</i>		12					
<i>Rhus trilobata</i> , Ill-scented sumac.....	2						
Live oak acorns.....	1						
Mesquite pods.....	1						
<i>Prunus minutiflora</i>	1						
Grasses from thickets.....				5			
<i>Lesquerella Gordonii</i>						5	
<i>Astragalus Nuttallianus</i>						5	
<i>Euphorbia dictyosperma</i>						5	
<i>Plantago rhodosperma</i>						5	

Table 8. Percentages of Forages Eaten by Range Sheep

	May, 1931 %	June, 1931 %	July, 1931 %	August, 1931 %	September, 1931 %	October, 1931 %	November, 1931 %	December, 1931 %
Curly mesquite, <i>Hilaria Belangeri</i>	23	64	55	70	88	54	83	28
Live oak acorns.....						6	5	
Live oak, <i>Quercus virginiana</i>	1	1		1	5	1	3	22
Sacahuiste, <i>Nolina texana</i>						28	2	25
<i>Aphanostephus humilis</i>	12	14	37					
<i>Carex planostachys</i>	9						1	23
<i>Centaurium calycosum</i>	13	2						
<i>Zexmania hispida</i>	10			3				
<i>Rhus trilobata</i>	1	4	1	10	3	1	3	
<i>Aristida purpurea</i>						9	1	1
<i>Sida procumbens</i>	3	3	2				1	
<i>Schrankia angustata</i>	3	1						
<i>Celtis reticulata</i>	1							
<i>Acacia Roemeriana</i>	2							
<i>Solanum elaeagnifolium</i>			1					
<i>Cuscuta exaltata</i>			2	3				
<i>Rhynchosia texana</i>			1					
<i>Oenothera speciosa</i>				3				
<i>Panicum Hallii</i>				1				
<i>Abutilon incanum</i>				2				
<i>Talinum aurantiacum</i>				3				
<i>Boerhaavia tenuifolia</i>				1				
<i>Portulaca retusa</i>				1				
<i>Croton monanthogynus</i>		1		1	1			
<i>Verbena plicata</i>				1				
<i>Siphonoglossa pilosella</i>				1				
<i>Chamaesaracha sordida</i>					2			
<i>Aster ericoides</i>					1			
<i>Houstonia angustifolia</i>						1	1	
<i>Lepidium lasiocarpum</i> Wrightii.....	4							
<i>Amaranthus blitoides</i>	2	3						
<i>Valerianella ameralla</i>	9							
<i>Sedum Nuttallianum</i>	7							
<i>Pinaropappus roseus</i>								
<i>Gutierrezia texana</i>		1						
<i>Panicum obtusum</i>		2						
<i>Desmanthus fallax</i>		2						
<i>Pyrrhopappus carolinianus</i>		1						

Table 9. Percentages of Forage Eaten by Range Goats

	October, 1930 %	November, 1930 %	December, 1930 %	January, 1931 %	February, 1931 %	March, 1931 %	April, 1931 %
Curly mesquite, <i>Hilaria Belangeri</i>	64	36	14	3		2	5
Live oak acorns.....	15	6					
Live oak, <i>Quercus virginiana</i>	12	32	59	77	33	3	15
Mixed plants.....	1	12		1	7		
Other grasses.....			16	4			
<i>Festuca octoflora</i>					54	14	
<i>Lesquerella Gordonii</i>						20	
<i>Trisetum interruptum</i>							25
<i>Engelmannia pinnatifida</i>							50
Shin oak, <i>Quercus brevifolia</i>	1	1					5
<i>Rhus trilobata</i> , Ill-scented sumac.....	6	5					
<i>Carex planostachys</i>		2			4	4	
<i>Prunus minutiflora</i>	1	2					
<i>Bumelia texana</i>		2					
<i>Berberis trifoliata</i>		2					
Sacahuiste, <i>Nolina texana</i>			5	8			
Prickly pear (Buds and Young fruit of prickly pear).....			4	2			
Mescal bean (<i>Sophora secundiflora</i>).....			1	4			
Tasajillo (<i>Opuntia leptocaulis</i>).....			1	1			
<i>Aristida</i> spp. Three-awn grass.....					1		
Sacahuiste buds.....					1	1	
<i>Juniperus Pinchotii</i> (foliage).....						2	
<i>Forestiera neomexicana</i>						2	
<i>Lepidium lasiocarpum Wrightii</i>						10	
<i>Astragalus Nuttallianus</i>						10	
<i>Astragalus macilentus</i>						5	
<i>Euphorbia dictyosperma</i>						4	
<i>Vicia Leavenworthii</i>						1	
<i>Plantago rhodosperma</i>						1	
<i>Plantago spinulosa</i> and other forbs.....						10	
<i>Evax multicaulis</i> and other forbs.....						10	
<i>Yucca Treuleana</i> (buds).....						1	

Table 10. Percentages of Forage Eaten by Range Goats

	May, 1931 %	June, 1931 %	July, 1931 %	August, 1931 %	September, 1931 %	October, 1931 %	November, 1931 %	December, 1931 %
Curly mesquite, <i>Hilaria Belangeri</i>	24	35	45	10	63	43	18	7
Live oak acorns.....	8	8	9	40	5	12	8	1
Live oak, <i>Quercus virginiana</i>	1	2	18	15	24	34	26	50
Shin oak, <i>Quercus breviloba</i>	4	.....	15	4	1	.....	23	2
<i>Rhus microphylla</i>	8	16	5	15	5	1	17	.....
<i>Rhus trilobata</i> , Ill-scented sumac.....	10	.....	.....	.....	.....	.....	4	32
<i>Carex planostachys</i>	8	.....	.....	.....	.....	.....	.....	.....
<i>Prunus minutiflora</i>.....	.....	.....	.....	.....	.....	.....	2	.....
<i>Rhus virens</i>.....	.....	.....	.....	.....	.....	.....	1	8
Sacahuiste, <i>Nolina texana</i>.....	.....	.....	3	.....	.....	.....	.....	.....
<i>Forestiera neomexicana</i>	1	.....	.....	.....	.....	.....	.....	.....
<i>Lepidium lasiocarpum Wrightii</i>	10	.....	.....	1	.....	.....	.....	.....
<i>Centaureum calycosum</i>	5	3	.....	.....	.....	.....	.....	.....
<i>Tragia ramosa</i>	5	2	.....	.....	.....	.....	.....	.....
<i>Sida procumbens</i>	1	4	1	.....	.....	.....	.....	.....
<i>Aphanostephus humilis</i>	1	.....	.....	.....	.....	.....	.....	.....
<i>Actinea scaposa linearis</i>	1	.....	.....	.....	.....	.....	.....	.....
<i>Thelesperma simplicifolium</i>	4	3	.....	.....	.....	.....	.....	.....
<i>Ratibida columnifera</i>	3	.....	.....	1	.....	.....	.....	.....
<i>Verbena plicata</i>	1	.....	.....	.....	.....	.....	.....	.....
<i>Sophora secundiflora</i> (leaves).....	4	.....	.....	.....	.....	.....	.....	.....
<i>Condalia obtusifolia</i>.....	.....	.....	1	.....	.....	.....	.....	.....
<i>Cassia Roemeriana</i>.....	.....	.....	1	.....	.....	.....	.....	.....
<i>Cuscuta exaltata</i>.....	.....	.....	1	.....	.....	.....	.....	.....
<i>Rhynchosia texana</i>.....	.....	.....	.....	3	.....	.....	.....	.....
<i>Panicum Hallii</i>.....	.....	2	.....	1	.....	.....	.....	.....
<i>Amaranthus blitoides</i>.....	.....	.....	1	1	.....	.....	.....	.....
<i>Abutilon incanum</i>.....	.....	3	.....	1	.....	.....	.....	.....
<i>Zexmanian hispida</i>.....	.....	.....	.....	1	.....	.....	.....	.....
<i>Portulaca retusa</i>.....	.....	2	.....	1	.....	2	.....	.....
<i>Croton monanthogynus</i>.....	.....	.....	.....	1	.....	.....	.....	.....
<i>Prosopis chilensis</i> , Mesquite.....	.....	.....	.....	5	.....	.....	.....	.....
<i>Mimosa fragrans</i>.....	.....	.....	.....	.....	1	.....	.....	.....
<i>Chamaesaracha sordida</i>.....	.....	.....	.....	.....	1	.....	.....	.....
<i>Opuntia</i> sp.....	.....	.....	.....	.....	.....	.....	.....	.....
<i>Aristida purpurea</i>.....	.....	.....	.....	.....	.....	5	.....	.....
<i>Houstonia angustifolia</i>.....	.....	.....	.....	.....	.....	3	1	.....
<i>Plantago Helleri</i>	1	.....	.....	.....	.....	.....	.....	.....
<i>Panicum hirticaule</i>.....	.....	3	.....	.....	.....	.....	.....	.....
<i>Simsia calva</i>.....	.....	3	.....	.....	.....	.....	.....	.....
<i>Desmanthus fallax</i>.....	.....	3	.....	.....	.....	.....	.....	.....
<i>Schrankia angustata</i>.....	.....	2	.....	.....	.....	.....	.....	.....
<i>Acacia Roemeriana</i>.....	.....	9	.....	.....	.....	.....	.....	.....

Character of the Range Rations

The approximate grades of the range rations of the different kinds of animals was ascertained by combining the grade of the protein, lime, and phosphoric acid of the different feeds, as given in Table 2 with the quantities eaten as given in Tables 5, 6, 7, 8, 9 and 10. A summary by months is given in Table 11.

With the cattle, the grade of the ration for protein is 3, except in February, March, April and November, when the grade is 4. This means that the forage is fair in protein most of the year, but was probably deficient in February, March, April and November. The grade for lime is 1 to 2 throughout the year. This means that the ration is good to high in lime at all times. The grade for phosphoric acid is 3 from March to August and also November and 4 for September through February except November. This means that the ration was fair in phosphorus part of the year, but probably deficient from September to March.

With sheep, the grade for protein was 3 excepting in February, March and July, when it was 2, and November, when it was 4. This means that the ration for sheep was fair to good in protein, except during November. The grade for lime (calcium) was 1 to 2 through the entire period, indicating that the ration was good to high in lime. The grade for phosphorus was 4 in September to December 1931, and December 1930 and January 1931, indicating a deficiency during these months. The remainder of the year, the ration was fair in phosphorus, except in February 1931, when it was good in phosphorus.

For goats, the grade for protein was 3, except for February, May and June when it was 2, and November, when it was 4. This indicates that the ration was fair in protein most of the year, and deficient in only one month. The grade for lime was from 1 to 2, indicating that the ration was well supplied with lime. The grade for phosphorus was 3 for March through August 1931 and 4 for October 1930 through February 1931, and October, November and December of 1931. This indicates a fair supply of phosphorus part of the year, but a probable deficiency during the fall and winter.

The grade for the protein, lime and phosphoric acid in the range forage will depend to a great extent upon the weather, especially on the rainfall or lack of rainfall, and the temperatures. Hence the grades will vary from year to year.

The data indicate that there is little deficiency of lime. Phosphorus is more likely to be deficient, especially during the winter months of very dry periods. Deficiencies of protein may also occur, likewise, during dry periods or the winter season.

The discussion of the data does not refer to the quantity of range vegetation available. It would appear, however, that a deficiency in quantity may often be accompanied by a deficiency in protein and in phosphorus.

Table 11.—Grades of Vegetation Eaten by Range Animals

	Protein Grade	Lime Grade	Phosphoric acid Grade
Cattle			
October, 1930	3	2	3
November	3	2	4
December	3	2	4
January, 1931	3	1	4
February	4	2	4
March	4	2	3
April	4	2	3
May	3	2	3
June	3	2	3
July	3	2	3
August	3	1	3
September	3	1	4
October	3	2	4
November	4	1	4
December	3	2	4
Sheep			
October, 1930	3	2	3
November	2	2	3
December	3	2	4
January, 1931	3	1	4
February	2	1	2
March	2	2	3
April	3	2	3
May	3	2	3
June	3	2	3
July	2	2	3
August	3	1	3
September	3	1	4
October	3	2	4
November	4	2	4
December	3	2	4
Goats			
October, 1930	3	2	4
November	3	2	4
December	3	2	4
January, 1931	3	1	4
February	2	1	4
March	3	2	3
April	3	1	3
May	2	1	3
June	2	1	3
July	3	1	3
August	3	1	3
September	3	1	4
October	3	2	4
November	4	1	4
December	3	1	4

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SUMMARY

Feeding analyses, and analyses for potash, lime, magnesia and phosphoric acid were made of 349 samples of grasses, leaves, and other parts of range vegetation in Sutton and Edwards Counties.

In order to facilitate comparison, the protein, phosphoric acid and lime in the samples were graded, Grade No. 1 containing the highest percentages and No. 5, the lowest.

The percentages of the different kinds of vegetation consumed by cattle, by sheep and by goats were ascertained monthly for a period of 15 months. Cattle fed on the smallest number of different kinds of plants, sheep came next, while the diet of goats was quite diversified.

The approximate grades of the diet of the range animals were ascertained by considering the grades of the vegetation eaten in connection with the percentage of each plant.

The ration of the cattle was fair (grade 3) in percentage of protein most of the year but probably deficient (grade 4) in February, March, April and November. The lime content was good to high (grades 2 and 1) at all times. The phosphoric acid content was fair (grade 3) from March to August, but probably deficient (grade 4) September through February.

For sheep, the protein content was fair (grade 3) through most of the period, although in 3 months the grade was good (grade 2), and in November it was probably deficient (grade 4). The lime content was good to high. The phosphoric acid was fair most of the year, except in December 1930, January 1931, and September to December 1931, when it was probably deficient (grade 4).

For goats, the grade for protein was fair to good, except in November, when protein was probably deficient (grade 4). The lime content was high to good. The phosphoric acid content was fair for March through August 1931, but probably deficient (grade 4) for October 1930 through February 1931, and October, November and December 1931.

The data indicate deficiencies of protein and phosphorus during the winter months, when the pasture is also short. The deficiency indicated is not, however, as great in other sections of the state.